STEVENS BRANCH WATERSHED
RIVER CORRIDOR MANAGEMENT PLAN

STEVENS AND JAIL BRANCHES
OF THE WINOOSKI RIVER,
WASHINGTON AND ORANGE COUNTIES, VT

Friends of the Winooski River,
Winooski Natural Resources Conservation District,
Central Vermont Regional Planning Commission

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TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY.....16

IN THE SPRING OF 2008 THE FRIENDS OF THE WINOOSKI RIVER (FWR), WINOOSKI NATURAL RESOURCES CONSERVATION DISTRICT (WNRCD), AND CENTRAL VERMONT REGIONAL PLANNING COMMISSION (CVRPC), COLLECTIVELY REFERRED TO AS "THE PARTNERS", ISSUED A REQUEST FOR PROPOSALS ON A PHASE 2 GEOMORPHIC ASSESSMENT FOR THE STEVENS BRANCH PORTION OF THE WINOOSKI RIVER WATERSHED. THIS PROJECT WAS PART OF A RIVER CORRIDOR GRANT AGREEMENT WITH THE VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION RIVER MANAGEMENT PROGRAM (VT DEC RMP), UNDER WHICH THE PARTNERS ALSO COMPLETED A PHASE 1 ASSESSMENT ON ROUGHLY 75 STREAM MILES DURING 2008 (PREVIOUS ASSESSMENT HAD BEEN COMPLETED ON AN ADDITIONAL 35 MILES); THE RESULTS OF THAT ASSESSMENT WERE USED TO INFORM SELECTION OF PHASE 2 REACHES (REACHES ARE PORTIONS OF THE STREAM WITH SIMILAR CHARACTERISTICS IN TERMS OF CHANNEL GEOMETRY, VALLEY, AND FLOODPLAIN SETTINGS). THE PHASE 2 ASSESSMENT INCLUDED SEVEN REACHES ON THE STEVENS BRANCH MAINSTEM IN THE TOWNS OF BARRE AND WILLIAMSTOWN; FIVE REACHES ON THE JAIL BRANCH IN BARRE CITY AND TOWN, AND TWO REACHES ON HONEY BROOK, A TRIBUTARY TO THE JAIL BRANCH.....16

2.0 INTRODUCTION.....20

2.1 PROJECT OVERVIEW.....20

3.0 BACKGROUND INFORMATION.....23

3.1 GEOGRAPHIC SETTING.....23
3.1.1 Watershed description.....23
3.1.2 Political jurisdictions.....23
3.1.3 Land use history and current general characteristics.....23

3.2 GEOLOGIC SETTING.....28
3.2.1 Surficial geology.....28
3.2.2 Soils.....30

3.3 GEOMORPHIC SETTING.....33

3.4 HYDROLOGY.....34
3.4.1 Stevens Branch Watershed StreamStats.....34
3.4.2 Stevens Branch watershed flood history.....34

3.5 ECOLOGICAL SETTING.....43

4.0 METHODS.....44

4.1 STREAM GEOMORPHIC ASSESSMENT.....44

4.2 QUALITY ASSURANCE, QUALITY CONTROL, AND DATA QUALIFICATIONS.....45

5.1 DEPARTURE ANALYSIS.....46
5.1.1 Watershed-scale hydrologic regime stressors.....46
5.1.2 Watershed-scale sediment regime stressors.....49
5.1.3 Reach-scale stressors.....52
5.1.3a Channel slope modifiers.....62
5.1.3b Channel depth modifiers.....65
5.1.3c Boundary condition and riparian modifiers.....68

5.2 SENSITIVITY ANALYSIS.....88

6.0 PRELIMINARY PROJECT IDENTIFICATION.....91

6.1 REACH DESCRIPTIONS—PRELIMINARY PROJECT IDENTIFICATION.....93

With these overarching considerations, preliminary project identification for the Stevens Branch Project area is presented on a reach-by-reach basis in the following pages. "Left bank" and "right bank" in the reach descriptions are referenced looking downstream. Background imagery for the reach maps is from the National Agricultural Imagery Program (NAIP), dated 2003. Valley walls delineated on the reach maps are based on the Phase 2 field verification of Phase 1 valley walls. 93
6.1.2 Reach M1.11 - Stevens Branch mainstem from just above tributary that crosses Route 14 approximately 900 feet north of Morris Drive to just upstream of tributary that enters from across Route 14 between Morin Road and Kings Row. 100
6.1.3 Reach M1.12 - Stevens Branch mainstem from just upstream of tributary that enters from across Route 14 between Morin Road and Kings Row to just south of the intersection between Route 14 and Farnham Road (Figure 34).....105
6.1.4 Reach M1.13 - Stevens Branch mainstem just south of the intersection between Route 14 and Farnham Road to just upstream of tributary entry from the west, at the south end of agricultural fields. 108
6.1.4 Reach M1.14 - Stevens Branch mainstem from just upstream of tributary entry from the west at the south end of agricultural fields (west of Hulbert Road) to just upstream of bridge crossing on Route 14, north of Fallsbridge Road. 110
.....111
6.1.5 Reach M1.15 - Stevens Branch mainstem from just upstream of bridge crossing on Route 14, north of Fallsbridge Road to just downstream of private bridge (upstream of tributary confluence) in the vicinity of Zampieri Drive.....113
6.1.6 Reach M1.16- Stevens Branch mainstem from just downstream of private bridge (upstream of tributary confluence in the vicinity of Zampieri Drive), extending to upstream of the bridge on Circle Street (roughly west of the midpoint between Vesper Road and Short Street off of Brockway Road....117
6.1.7 Reach T3.01 - Jail Branch from just the confluence of the Jail Branch and Stevens Branch mainstem, to just upstream of the Ayers Road bridge.....121
6.1.8 Reach T3.02 - Jail Branch from just upstream of the Ayers Road bridge to just upstream of the confluence with Honey Brook.....126
6.1.9 Reach T3.03 - Jail Branch from just upstream of the confluence with Honey Brook to tributary confluence (from the south) just upstream of beginning of huge mass failures along the north valley wall 130
6.1.10 Reach T3.04 - Jail Branch from tributary confluence (from the south), just upstream of beginning of huge mass failures along the north valley wall, to just downstream of the old dam near Rte. 110 (Washington Rd.) in East Barre. 134

6.1.11 Reach T3.05 - Jail Branch from the old dam near Washington Road in East Barre to the flood control Dam approximately 0.5 miles upstream. 140
6.1.12 Reach T3.02S4.01- Honey Brook from its confluence with the Jail Branch to just upstream of East Cobble Hill Road....146
6.1.13 Reach T3.02S4.02- Honey Brook from just upstream of East Cobble Hill Road to the headwaters, upstream of Osborne Road....148

6.2 PROJECT PRIORITIZATION....151

LITERATURE CITED....163

TABLE OF FIGURES

FIGURE 1. SIX MAINSTEM AND SEVEN TRIBUTARY REACHES INCLUDED IN THE STEVENS BRANCH CORRIDOR PLANNING PROCESS. INSET SHOWS THE LOCATION OF THIS AREA IN TERMS OF THE ENTIRE STATE. 22

FIGURE 2. PICTURES OF THE STEVENS BRANCH VALLEY A WEEK AFTER THE 1927 FLOOD (LOOKING NORTH) SHOWS EXTENSIVE AREAS OF CLEARING IN THE VALLEYS AND PORTIONS OF ADJACENT LOWER HILLSIDES, EVEN AT THIS LATE DATE (RELATIVE TO CLEARING OF THE LAND DURING THE 1800S).....24

FIGURE 3: 1924 TOPOGRAPHIC MAP OF THE CONFLUENCE OF THE STEVENS AND JAIL BRANCHES, SHOWING RAILROAD DEVELOPMENT ALONG THE STEVENS BRANCH MAINSTEM AND THE LOWER JAIL BRANCH.....25

FIGURE 4: LAND COVER/LAND USE ANALYSIS BASED ON SATELLITE IMAGERY (UVM-SAL 2002) INDICATES MODERATE FOREST COVER IN THE STEVENS BRANCH BASIN, WITH AGRICULTURAL AND DEVELOPED LAND COMPRISING A SIGNIFICANT PORTION OF THE LAND USE AS WELL, PARTICULARLY IN CENTRAL PORTIONS OF THE WATERSHED.…27

FIGURE 5: BEDROCK GEOLOGY MAP FOR CENTRAL VERMONT.....29

FIGURE 6: SURFICIAL GEOLOGY IN THE STEVENS BRANCH WATERSHED 31

FIGURE 7. USGS STREAMSTATS PEAK STREAMFLOW AND BASIN CHARACTERISTICS STATISTICS REPORTS FOR THE STEVENS BRANCH DRAINAGE BASIN.....36

FIGURE 8: WETLANDS AND HYDRIC SOILS MAP FOR THE STEVENS BRANCH WATERSHED.....37

FIGURE 9: ANNUAL PEAK FLOWS AT THE MAD RIVER GAGE, NEAR MORETOWN, FROM 1927 TO 2008.....40

FIGURE 10: ANNUAL PEAK FLOWS AT DOG RIVER GAGE FROM 1935 TO 2008. 41

FIGURE 11. JULY, 2007: REPEATED THUNDERBURSTS CAUSED EXTENSIVE FLOODING IN BARRE CITY (CREDIT STEFAN HARD, TIMES ARGUS). 42

FIGURE 12. FLOODING DAMAGE THAT OCCURRED AT THE BASE OF HONEY BROOK DURING JULY 2007 WAS REPEATED IN 2008. IN RESPONSE, THE HOUSE IN THE BACKGROUND WAS PURCHASED AND REMOVED DURING FALL 2008.....43

FIGURE 13: HYDROLOGIC ALTERATIONS FOR THE ENTIRE STEVENS BRANCH WATERSHED. 47

FIGURE 14: SEDIMENT LOAD INDICATORS FOR PHASE 2 STUDY REACHES. 51

FIGURE 15: REACH-SCALE STRESSORS: CHANNEL SLOPE MODIFIERS FOR PHASE 2 REACHES ON THE STEVENS BRANCH.....63

FIGURE 16: REACH-SCALE STRESSORS: CHANNEL SLOPE MODIFIERS FOR PHASE 2 REACHES ON THE JAIL BRANCH AND HONEY BROOK....64

FIGURE 17: REACH-SCALE STRESSORS: CHANNEL DEPTH MODIFIERS FOR THE PHASE 2 REACHES ON THE STEVENS BRANCH.....66

FIGURE 18: REACH-SCALE STRESSORS: CHANNEL DEPTH MODIFIERS FOR THE PHASE 2 REACHES ON THE JAIL BRANCH AND HONEY BROOK. 67

FIGURE 19. REACH-SCALE STRESSORS: BOUNDARY CONDITION AND RIPARIAN MODIFIERS MAP FOR THE PHASE 2 REACHES ON THE STEVENS BRANCH.....69

FIGURE 20: REACH-SCALE STRESSORS: BOUNDARY CONDITION AND RIPARIAN MODIFIERS MAP FOR THE PHASE 2 REACHES ON THE JAIL BRANCH AND HONEY BROOK.....70

FIGURE 21. THE CHANNEL BALANCE INDICATES HOW CHANGES IN WATERSHED INPUTS INFLUENCE CHANNEL ADJUSTMENT PROCESSES (LANE 1955).....71

FIGURE 22. CHANNEL EVOLUTION PROCESS SHOWING CHANNEL DOWNCUTTING OR INCISION IN STAGE II (CROSS SECTION), WIDENING THROUGH STAGES III AND IV, AND FLOODPLAIN REESTABLISHMENT IN

STAGE V. STAGES I AND V REPRESENT EQUILIBRIUM CONDITIONS. PLAN VIEW SHOWS STRAIGHTENING AND MEANDER REDEVELOPMENT THAT ACCOMPANY CROSS-SECTION CHANGES, A FLOOD-DRIVEN PROCESS TAKING PLACE OVER DECADES (VT ANR 2007B).....73

FIGURE 23: SEDIMENT REGIME DEPARTURE: SEDIMENT REGIMES FOR THE PHASE 2 PROJECT AREA; REFERENCE CONDITIONS VS. EXISTING CONDITIONS.....78

FIGURE 24. MAP OF EXISTING SEDIMENT REGIME IN CONJUNCTION WITH VERTICAL AND LATERAL CONSTRAINTS TO CHANNEL EVOLUTION FOR THE STEVENS BRANCH REACHES WITHIN THE STEVENS BRANCH CORRIDOR PLANNING PROJECT AREA.....80

FIGURE 25: MAP OF EXISTING SEDIMENT REGIME IN CONJUNCTION WITH VERTICAL AND LATERAL CONSTRAINTS TO CHANNEL EVOLUTION FOR THE JAIL BRANCH AND HONEY BROOK REACHES WITHIN THE STEVENS BRANCH CORRIDOR PLANNING PROJECT AREA.....81

FIGURE 26: STREAM SENSITIVITY ANALYSIS AND STREAM TYPE DEPARTURES FOR THE STEVENS BRANCH 2008 ASSESSMENT AREA. STREAM TYPE DEPARTURES ARE DEPICTED AS AGGRADATIONAL, DEGRADATIONAL, OR A COMBINATION OF THE TWO.....91

FIGURE 27: REACH M1.10 OF THE STEVENS BRANCH MAINSTEM. 96

FIGURE 28: SEGMENT M1.10B FEATURES, CLOCKWISE FROM TOP RIGHT: MASS FAILURE WITH STORMWATER PIPE, DEPOSITIONAL BARS, MASS FAILURE WITH NARROW BUFFER, TYPICAL BANK EROSION WITH NO BUFFER.....98

FIGURE 29: EXAMPLE OF ELEVATED ENCROACHMENT/DEVELOPMENT ON RB IN SEGMENT M1.10C.....98

FIGURE 30: SEGMENT M1.10D TRIBUTARY HAS SCOURED A CHANNEL BACK TOWARDS ROUTE 14 (SEEN IN THE BACKGROUND). CULVERT AT ROAD IS NOW ELEVATED SIGNIFICANTLY ABOVE TRIBUTARY FLOOR, AND FURTHER UPSTREAM MIGRATION OF A HEADCUT COULD START TO UNDERMINE THE ROAD.....99

FIGURE 31: REACH M1.11 OF THE STEVENS BRANCH MAINSTEM.....102

FIGURE 32: SEGMENT M1.11A IS SHOWING SIGNS OF WIDENING AND AGGRADATION.....103

FIGURE 33: SEGMENT M1.11B HAS BEEN EXTENSIVELY STRAIGHTENED AND RIPRAPPED. FARM BRIDGE STRUCTURE IS A CHANNEL CONSTRICTION. 104

FIGURE 34: REACHES M1.12 AND M1.13 ON THE STEVENS BRANCH MAINSTEM.....106

FIGURE 35: SEGMENT B OF REACH M1.12 HAS BEEN EXTENSIVELY ENCROACHED UPON AND DEVELOPED ALONG ITS RIGHT BANK.....107

FIGURE 36: M1.13 IS WIDENING AND AGGRADING (LEFT), AND AREAS OF BANK EROSION ARE COMMON (RIGHT).....109

FIGURE 37: STEVENS BRANCH REACH M1.14.....111

FIGURE 38: STEVENS BRANCH REACH M1.14 SHOWING AGRICULTURAL USE ON THE WEST SIDE (LEFT) AND ENCROACHMENT AND ARMORING ON THE EAST SIDE (RIGHT).....112

FIGURE 39: STEVENS BRANCH REACH M1.15. NOTE EXTENSIVE FLOODPLAIN OF HYDRIC SOILS.....115

FIGURE 40: STEVENS BRANCH SEGMENTM1.15A SHOWS ACTIVE SIGNS OF WIDENING, AGGRADATION AND PLANFORM CHANGE.....115

FIGURE 41: STEVENS BRANCH MAINSTEM SEGMENT M1.15B. THIS REACH FLOODED IN 2007, JUMPING THE ROAD AND FLOWING INTO A COMMERCIAL GARAGE PROPERTY (LEFT). POSSIBLY THIS SAME FLOODING EVENT DEPOSITED LARGE AMOUNTS OF SEDIMENT UPSTREAM OF A SHARP MEANDER CURVE AT BROCKWAY ROAD BRIDGE (RIGHT).....116

FIGURE 42: STEVENS BRANCH MAINSTEM REACH M1.16.....118

FIGURE 43: STEVENS BRANCH MAINSTREAM SEGMENT M1.16A HAS TWO OLD MILL SITE ABUTMENTS (LEFT) AND A COARSE, STABLE SUBSTRATE (RIGHT). BEGINNING OF BEDROCK GRADE CONTROLS (SEGMENT M1.16B) CAN BE SEEN IN THE DISTANCE OF FIGURE AT RIGHT.....119

FIGURE 44: STEVENS BRANCH MAINSTEM SEGMENT M1.16B HAS SEVERAL SERIES OF GRADE CONTROLS AND OLD MILL SITE ABUTMENTS. 120

FIGURE 45: JAIL BRANCH REACH T3.01 IN BARRE CITY.....123

FIGURE 46: JAIL BRANCH SEGMENT T3.01A HAS HIGH LEVELS OF ENCROACHMENT AND DEVELOPMENT. NOTE THE PROXIMITY OF THE WAREHOUSE BUILDING AT RIGHT IN THE PHOTO LOOKING UPSTREAM (LEFT). BRIDGES ARE TRAPPING SEDIMENT AND DEBRIS (RIGHT).....124

FIGURE 47: JAIL BRANCH SEGMENT T3.01B HAS A SIGNIFICANT MASS FAILURE ON THE RIGHT BANK THAT POSES AN IMMEDIATE THREAT TO THE HOUSE ABOVE (THIS LANDOWNER CONTACTED THE PROJECT PARTNERS TO ALERT THEM TO HIS PLIGHT).....125

FIGURE 48: JAIL BRANCH REACH T3.02.....127

FIGURE 49: JAIL BRANCH SEGMENT T3.02A HAS BOTH A STEEP NARROW VALLEY WITH WATERFALLS (LEFT) AND A WIDE CHANNEL WITH BEDROCK IN THE BED AND STEEP VALLEY WALLS (RIGHT).....128

FIGURE 50: JAIL BRANCH SEGMENT T3.02B: LARGE AGGRADATIONAL BARS ARE CREATING NEW FLOOD PLAIN (TOP LEFT); LEFT BANK VALLEY WALL SHOWS SIGNS OF INSTABILITY (TOP RIGHT); RIGHT BANK DEVELOPMENT IS COMMON AND OFTEN INCLUDES DUMPING IN THE STREAM CHANNEL (LOWER LEFT); RIGHT BANK ROAD ENCROACHMENT AND RIPRAPPING IS FREQUENT (LOWER RIGHT).....129

FIGURE 51: JAIL BRANCH REACH T3.03. 131

FIGURE 52: JAIL BRANCH SEGMENT T3.03A: STEEP VALLEY WALLS ARE FREQUENTLY UNSTABLE (TOP LEFT); SITE OF OLD ROUTE 302 THAT WASHED OUT IN 1927 FLOODING (TOP RIGHT), AREAS OF ACCESSIBLE FLOOD PLAIN ARE INTERMITTENT (LOWER LEFT); ROAD ENCROACHMENT AND RIPRAPPING ARE COMMON (LOWER RIGHT).....133

FIGURE 53: JAIL BRANCH SEGMENT T3.03B: ENORMOUS MASS FAILURES ON THE RIGHT VALLEY EDGE HAVE THE POTENTIAL TO CONTINUE SUPPLYING SIGNIFICANT AMOUNTS OF SEDIMENT TO THE STREAM. DEVELOPMENT ON ELEVATED FILL ALONG THE LEFT BANK FORCES THE STREAM TOWARDS THESE MASS FAILURES. THIS SEGMENT HAS A STEEPER SLOPE THAN SEGMENT T3.03A AND INCLUDES MORE BOULDERS IN THE SUBSTRATE.....133

FIGURE 54: JAIL BRANCH REACH T3.04. 136

FIGURE 55: JAIL BRANCH REACH T3.04 SEGMENT B HAS HAD CONSIDERABLE FILL ADDED TO THE LEFT BANK (LEFT). THE MASS FAILURE AT THE BASE OF THE SEGMENT SHOWS RECENT EROSION ACTIVITY (UPPER RIGHT). THE COMBINATION OF DEVELOPMENT ENCROACHMENT AND STEEP UNSTABLE VALLEY WALLS IS A PROBLEMATIC ONE FOR THE JAIL BRANCH (LOWER RIGHT).....138

FIGURE 56: JAIL BRANCH SEGMENT T3.04D. FILL ADDED TO THE RIGHT BANK HAS SEVERELY NARROWED THE NATURAL VALLEY (LEFT). 139

FIGURE 57: JAIL BRANCH REACH T3.05.....142

FIGURE 58: JAIL BRANCH REACH T3.05 SEGMENT A HAS BEEN IMPACTED BY FILL AND DEVELOPMENT IN THE NATURAL STREAM VALLEY (LEFT). AN OLD MILL SITE DOWNSTREAM OF THE WASHINGTON ROAD IS STILL FUNCTIONING AS A GRADE CONTROL AND CHANNEL CONSTRICTION.....143

FIGURE 59: JAIL BRANCH REACH T3.05 SEGMENT B IS PRIMARILY IMPACTED BY THE FLOOD CONTROL DAM. PHOTOS ABOVE SHOW EXTENSIVE BANK MANIPULATION AND STREAM STRAIGHTENING.....143

FIGURE 60: HONEY BROOK REACH T2S4.01.....145

FIGURE 61: HONEY BROOK SEGMENT T3.02S4.01A. A COMBINATION OF HEAVY RAINS, MASS FAILURES (TOP), AND A CHANNEL CONSTRICTION (LOWER LEFT) CONTRIBUTED TO EXTENSIVE FLOOD IMPACTS (LOWER RIGHT) IN 2007 AND AGAIN IN 2008.....147

FIGURE 62: HONEY BROOK REACH T3.02S4.02.....149

FIGURE 63: PROJECT PRIORITY #5; RE-LOCATION STORMWATER OUTPUT SO AS TO REDUCE IMPACTS ON MASS FAILING STREAM BANK. 157

FIGURE 64: PROJECT PRIORITY #6; ARREST HEAD CUT ON TRIBUTARY COMING IN FROM SANDPIT REGION TO EAST. HEAD CUT IS ARRESTED TEMPORARILY AT ROUTE 14.....158

FIGURE 65: PROJECT PRIORITY #7; BERM REMOVAL AT THE TOP OF REACH M1.15 TO GAIN ATTENUATION POTENTIAL.....159

FIGURE 66: PROJECT PRIORITY #8; STABILIZE STREAM BANK WITH MASS FAILURE THREATENING EXISTING HOUSE AND REDIRECT STREAM WATER AWAY FROM BANK.....160

FIGURE 67: PROJECT PRIORITY #9; EVALUATION POTENTIAL FOR CONTINUING SEDIMENT IMPUTS FROM THIS GULLY AND POTENTIAL FOR ARRESTING HEADCUTTING THERE.....161

FIGURE 68: PROJECT PRIORITY #10; EVALUATION POTENTIAL ATTENUATION BENEFITS IF BERM IS REMOVED ALONG RIGHT BANK OF SCHOOL PROPERTY. IMPACTS ON SCHOOL PROPERTY NEED TO BE ASSESSED.....162

TABLE OF TABLES

TABLE 1. STEVENS BRANCH WATERSHED LAND COVER/LAND USE FROM SATELLITE IMAGERY ANALYSIS.....26

TABLE 2. STEVENS BRANCH WATERSHED GEOLOGY AND SOILS FOR 2008 PHASE 2 REACHES (EXCERPTED AND COMBINED FROM PHASE 1, STEP 3 (GEOLOGY) AND STEP 3.5 (SOILS) ANALYSES. "%" INDICATES THE DOMINANT PORTION OF A SOIL COMPLEX CHARACTERIZED BY THE STATED RATING.....32

TABLE 3. REFERENCE STREAM TYPES AND GEOMORPHIC CHARACTERISTICS FOR STEVENS BRANCH, JAIL BRANCH AND HONEY BROOK REACHES INCLUDED IN 2008-09 CORRIDOR PLANNING PROJECT AREA.....33

TABLE 4. REFERENCE STREAM TYPE CLASSIFICATIONS SUMMARY (VT ANR 2007 PHASE 1 PROTOCOLS, P. 28). 33

TABLE 5: HISTORICAL FLOOD INFORMATION COMPILED FOR THE DOG RIVER AND RECALCULATED TO RELATE TO THE STEVENS BRANCH (BARG 2004).....38

TABLE 6: DOG RIVER (AT NORTHFIELD FALLS): GAGE IS WATER-STAGE RECORDER . DRAINAGE AREA: 76.1 MI².....39

TABLE 7: MAD RIVER (NEAR MORETOWN): GAGE IS WATER-STAGE RECORDER . DRAINAGE AREA: 139 MI².....39

TABLE 8. REFERENCE SEDIMENT REGIME PARAMETERS FOR STEVENS BRANCH BASIN 2008 STUDY AREA REACHES.....72

TABLE 9. PERTINENT DATA FOR CHARACTERIZING EXISTING SEDIMENT REGIME USING PHASE 2 DATA (VT ANR RCPG 2007).....72

TABLE 10. SEDIMENT REGIME CHARACTERIZATION CRITERIA FOR STEVENS BRANCH CORRIDOR PLANNING PROJECT AREA REACHES (SEE TABLES 8 & 9 ABOVE FOR COLOR CODING AND BRIEF DESCRIPTION OF SEDIMENT REGIMES).....75

TABLE 11. STEVENS BRANCH PROJECT AREA DEPARTURE ANALYSIS TABLE, INDICATING WHERE RIVER SEGMENTS ARE CONSTRAINED FROM ADJUSTMENT, CONVERTED TO TRANSPORT STREAMS, AND/OR

HAVE OR MAY SOMEDAY HAVE POTENTIAL FOR ATTENUATING FLOW AND SEDIMENT LOADS 82

TABLE 12.STEVENS BRANCH SEGMENT M1.10 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....99

TABLE 13.STEVENS BRANCH SEGMENT M1.11 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS). 105

TABLE 14.STEVENS BRANCH SEGMENT M1.12 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....108

TABLE 15.STEVENS BRANCH SEGMENT M1.13 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....109

TABLE 16. STEVENS BRANCH SEGMENT M1.14 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....112

TABLE 17.STEVENS BRANCH SEGMENT M1.15 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....116

TABLE 18.STEVENS BRANCH SEGMENT M1.16 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....121

TABLE 19.STEVENS BRANCH SEGMENT T3.01 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....125

TABLE 20.STEVENS BRANCH SEGMENT T3.02 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....130

TABLE 21.STEVENS BRANCH SEGMENT T3.03 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....134

TABLE 22.STEVENS BRANCH SEGMENT T3.04 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....139

TABLE 23.STEVENS BRANCH SEGMENT T3.05 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....144

TABLE 24. HONEY BROOK SEGMENT T3.02S4.01 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....148

TABLE 25.STEVENS BRANCH SEGMENT T3.02S4.02 PROJECTS AND PRACTICES TABLE USED THROUGHOUT THE STEPWISE PROJECT IDENTIFICATION PROCESS (VT ANR RCPG, CH. 6 STEP NUMBERS).....151

TABLE 26. POTENTIAL PROJECT PRIORITIZATION FOR THE STEVENS BRANCH CORRIDOR PLANNING PROJECT AREA.....154

1.0 EXECUTIVE SUMMARY

In the spring of 2008 the Friends of the Winooski River (FWR), Winooski Natural Resources Conservation District (WNRCD), and Central Vermont Regional Planning Commission (CVRPC), collectively referred to as "the Partners", issued a request for proposals on a Phase 2 geomorphic assessment for the Stevens Branch portion of the Winooski River Watershed. This project was part of a River Corridor Grant Agreement with the Vermont Department of Environmental Conservation River Management Program (VT DEC RMP), under which the Partners also completed a Phase 1 assessment on roughly 75 stream miles during 2008 (previous assessment had been completed on an additional 35 miles); the results of that assessment were used to inform selection of Phase 2 reaches (reaches are portions of the stream with similar characteristics in terms of channel geometry, valley, and floodplain settings). The Phase 2 assessment included seven reaches on the Stevens Branch mainstem in the Towns of Barre and Williamstown; five reaches on the Jail Branch in Barre City and Town, and two reaches on Honey Brook, a tributary to the Jail Branch.

The Stevens Branch drains the southeastern flank of the Winooski River watershed and comprises approximately 10% of its watershed area. The Winooski River is the second longest river in the state and flows through both the State's capital and the State's largest city. The Partners have been working to protect and promote a variety of assets in the rivers of the Winooski watershed, including natural resource values, economic opportunities, wildlife habitat, scenic value, and recreational amenities, for more than a decade, and this study provides information for this and similar efforts throughout the Winooski River basin. By assessing underlying causes of channel instability at both watershed and localized scales, and encouraging the stream's return to equilibrium conditions, management efforts can be directed toward long-term solutions that help curb escalating costs and efforts directed toward resolving conflicts with ongoing stream processes. These efforts can help reduce flood and erosion hazards along the river corridor, improve water quality and aquatic habitat, and enhance recreational opportunities along and in the river.

Data from the Phase 1 assessment of the watershed and Phase 2 assessments of a portion of the Stevens Branch, Jail Branch, and Honey Brook are used in this Corridor Management plan to inform project prioritization and methodology. A Phase 3 assessment process would then involve more detailed fieldwork for projects requiring survey and engineering-level data for identification and implementation of management and restoration alternatives.

The results of Phase 2 (rapid field assessment) geomorphic assessments of the Stevens Branch, Jail Branch, and Honey Brook are summarized in this report and are analyzed (in conjunction with relevant Phase 1 information) through the use of stressor, departure, and sensitivity analysis maps to integrate the findings in a more understandable and intuitive manner. This analysis informs a stepwise process designed to identify and catalogue potential projects consistent with reducing conflicts with stream dynamics in an economically and ecologically sustainable manner. Recommendations are made, at the same time, outlining the next steps toward evaluation of project feasibility (from both

social and technical standpoints), and implementation of protection and restoration efforts.

Based on the results of this assessment projects were recommended in order of importance (Section 6.2 Table 26). Project recommendations that cover many reaches include:

- Developing a fluvial erosion hazard (FEH) zone and belt-width cover for the entire project area in an effort to protect vital functions of the floodplain.
- Encourage landowners (in reaches with extensive erosion and areas of no buffer) to plant or allow buffers to return to appropriate vegetative cover, particularly in high priority reaches.
- Create a more detailed stormwater survey and management plan to assess and develop potential projects that will mitigate impacts of stormwater in high priority reaches (reaches with high numbers of stormwater imputs or stormwater impacts)
- Explore replacement possibilities for problematic culverts and bridges in the project area (as indicated in priority listing).

In addition to these broader scale projects, 6 reach-specific projects are recommended for reaches with features of special concern. These projects include removing berms, arresting headcuts, and stabilizing a stream bank.

Analysis contributing to these recommendations indicates that:

- Portions of the watershed included in the Project area, under equilibrium conditions, would provide flow, sediment, and nutrient storage and attenuation in many stream reaches.
- Due primarily to extensive straightening and channelization, leading to increased stream power that has historically incised (cut down) through erodible bed materials, many of these stream reaches have lost access to historical floodplains and these floodplains have been subsequently developed.
- Loss of access to floodplain means greater flows are now contained within the channel at high flow events; channelization means the stream now diffuses less of its power through meander patterns.
- Many reaches in the study area are now functioning primarily as transport reaches that transfer flow, sediment, and nutrient loads to downstream portions of the watershed. Sediment loads are being deposited primarily at constrictions that reduce stream power sufficiently to accelerate deposition, or when they become too great for the power of the stream to transport further. Within the project area there are 16 bridges, 3 culverts, and 6 old bridge abutments that are causing channel constrictions affecting twelve reaches. Nineteen of these structures have deposition associated with them.
- With many of the downstream reaches deeply incised, sediments are being recruited from tributaries, mass failures, and stream bank erosion as the physical dictates of the stream system try to balance the increased stream power with its sediment load; ensuring sediment transport continuity by reducing constrictions will allow these sediments to fulfill that role as they are redistributed throughout the stream network.

A passive restoration approach is generally recommended for the Project area due to low cost and high to extreme stream sensitivity (indicating the rate at which the river will return to dynamic equilibrium given its own energy and watershed inputs). This approach reduces costs for project implementation in comparison with active floodplain or meander restoration, or approaches such as continued channelization or armoring (in highly sensitive streams this is a costly prospect), but requires an emphasis on protection of the river corridor to reduce conflicts between land use and stream evolution processes. The primary goal would be regaining access to floodplains and reestablishment of stream meander geometry, both intended as a means of diffusing stream power and permitting greater nutrient and sediment storage within the watershed.

Land-use conflicts are elevated in portions of this watershed. Achieving stream channel equilibrium in these areas may not be a reasonable goal, but reducing conflict is critical and can only be achieved through protection of attenuation assets and movement towards stream equilibrium in other parts of the project area. Continued channel management in developed areas should be balanced with increased protections for the stream corridor elsewhere.

2.0 INTRODUCTION

Vermont's rivers and streams have a long history of being utilized and impacted by humans, and dramatic changes in the landscape have resulted over the last two hundred years. Long-term processes resulting from this history of interaction and mounting concerns about the potential effects of a changing climate increase the need to acknowledge and understand the escalating level of investment required to rebuild and/or protect property and livelihoods from damage caused by weather events or by erosion and nutrient loading on ecosystems and recreational resources. With increasing recognition of this situation, and informed with data from geomorphic assessments, communities have the opportunity to reduce conflict with rivers and streams by practicing management that favors an equilibrium between the power of moving water and the transport and storage of sediment that is held within that water (Vermont Agency of Natural Resources-River Management Program (VT ANR-RMP) 2006). Understanding the balance of these forces at a watershed scale, and the fact that occurrences in any portion of a watercourse are linked to processes unfolding in other parts of the watershed over intervals of both space and time, are critical to successful implementation of such management practices. The time and thought that go into this work may transform perpetually frustrated attempts at control, with often unanticipated consequences, to enjoyment of enhanced, vital resources.

2.1 PROJECT OVERVIEW

The Stevens Branch drains the southeastern flank of the Winooski River watershed and comprises approximately 10% of its watershed area. The Winooski River is the second longest river in the state (90 miles). It flows through mountains and farmland; through the state's capital and the state's largest city, before emptying 1,080 square miles of river basin into Lake Champlain. The river has long been valued recreationally and is well known for its nnatural beauty, significant fisheries, and abundant wildlife habitat. While the Winooski River has always yielded a multitude of benefits, including transportation, food source and power, to those living along its banks, the river's potential to flood has often taken its toll. Since 1973, Vermont suffered 13 major floods; 6 of these were within the Winooski River Watershed. In the flood of November 1927, Vermont's worst recorded flood to date, 55 died and $13,500,000 in property was lost. The loss of life and property during this event was greater than any other water course in New England. More recently, in the flood of March 1992 there were more than $2 million in damages in Montpelier. Recent flooding events in 2007 and 2008 affected this project area specifically; in the upper reaches of the Stevens mainstem, and where Honey Brook enters the Jail Branch. Heavy rains in these years also appears to be causing an increase in gully formation in tributaries feeding to these rivers. Several communications from landowners expressed concern over bank erosion problems (pers. comm. Gregoire, Dudley, Farnham, Sept, 2008), and gully formation in tributaries feeding into the project area (pers. comm. Somaini, Sept, 2008). Flooding continues to be a major concern and has been exacerbated by building and encroaching on floodplains (http://www.winooskiriver.org/watershedHistory.htm).

In an effort to promote and protect this resource, a grassroots community group was created. Friends of the Winooski River (FWR) was originally founded in 1992 by the River Network but has operated as an independent nonprofit since 1998 and is dedicated to the protection and restoration of the Winooski River, its tributaries and watershed. Since its inception, FWR has been an active partner and coordinator in developing and implementing community-based projects with landowners, schools, town governments, and organizations such as Winooski River Natural Resources Conservation District and the Central Vermont Regional Planning Commission. Projects have included stream restoration, community outreach, riparian buffer restoration, stream assessments, and preliminary corridor planning.

As a part of the overall efforts in the Winooski River Basin, a Phase 1 geomorphic assessment of the Stevens Branch Watershed was conducted by the Central Vermont Regional Planning Commission, in conjunction with Friends of the Winooski and Winooski River Natural Resources Conservation District (henceforward "the Partners"), in 2008. Based on the results of that assessment and a targeted budget approach, the Partners issued an RFP for Phase 2 assessment on a selection of prioritized reaches. Redstart Consulting, in collaboration with the project partners, selected the 2008 Phase 2 reaches at a scoping meeting in April 2008.

The 2008 Stevens Branch Watershed Phase 2 Assessment provides information to prioritize protection and restoration efforts on six Stevens Branch mainstem and seven tributary "reaches" (5 on the Jail Branch and 2 on Honey Brook). A "reach" is section of river with similar slope and valley setting. These 13 reaches comprise roughly 10 miles of stream (Fig. 1). The primary goal of the Project is to cooperate with landowners, community members, local towns, and other stakeholders to develop a community-based river corridor management plan for the Stevens Branch and its tributaries that will effectively enhance community and ecological health within the watershed. VT ANR-RMP has been developing the framework for a process to facilitate such a prioritization strategy (VT ANR 2007), and earlier phases of that process helped to identify the reaches selected for inclusion in the Project area. The goal of the River Management Program is to manage toward, protect, and restore the equilibrium conditions of Vermont rivers by resolving conflicts between human investments and river dynamics in the most economically and ecologically sustainable manner. The objectives include:

1. FEH mitigation;
2. Sediment and nutrient load reduction; and
3. Aquatic and riparian habitat protection and restoration

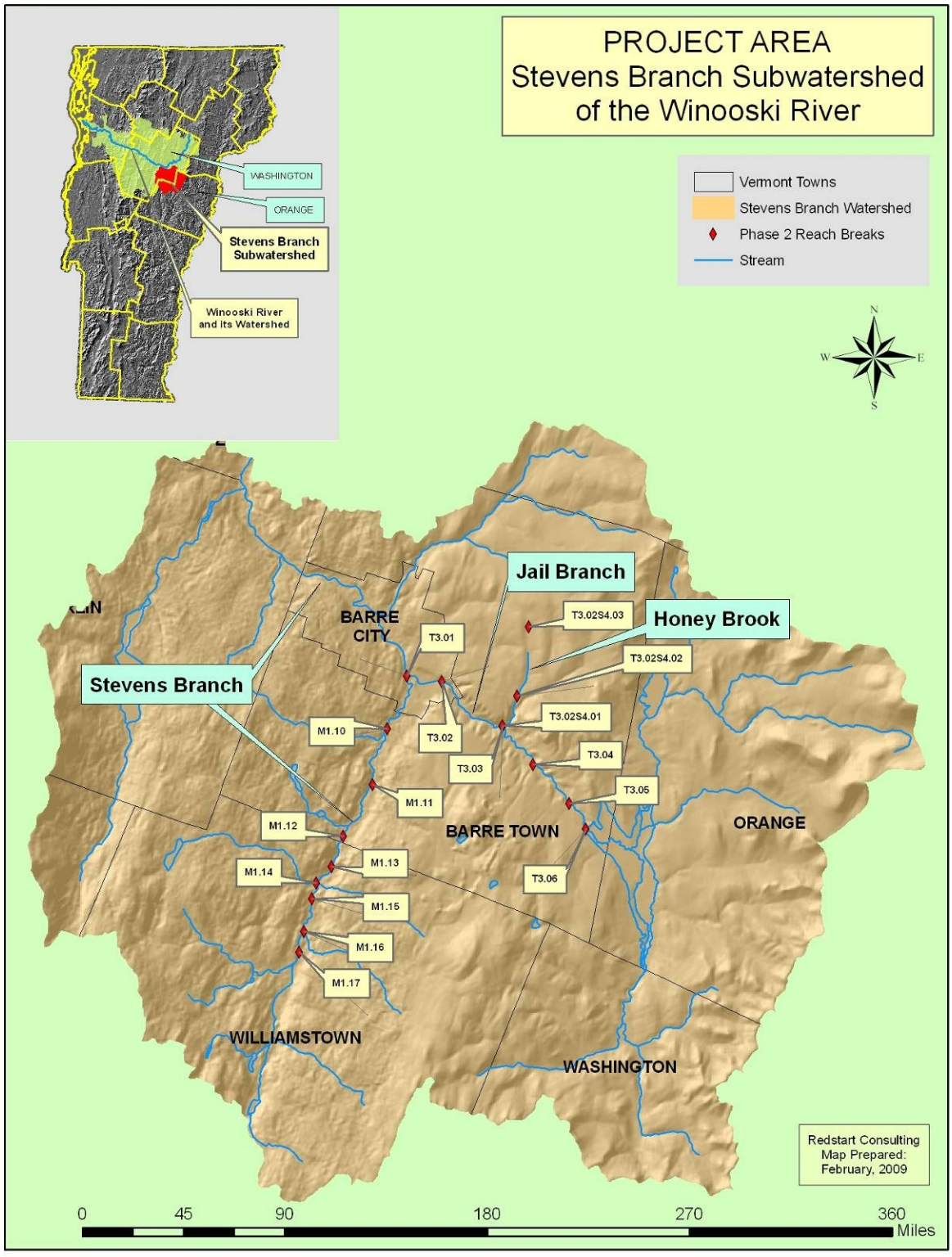

Figure 1. Six mainstem and seven tributary reaches included in the Stevens Branch Corridor Planning process. Inset shows the location of this area in terms of the entire State.

3.0 BACKGROUND INFORMATION

3.1 GEOGRAPHIC SETTING

3.1.1 Watershed description

The Stevens Branch drains the southeastern flank of the Winooski watershed. The Winooski sub basin is located within the Riviere Richelieu Basin of Vermont and New York states, and Quebec, Canada. (Fig. 1). The Winooski River Basin drains roughly 1,080 square miles, ranging from roughly 4000 feet in elevation in areas along the spine of the Green Mountains running south-north through the middle of the watershed, to approximately 100 feet where the Winooski drains into Lake Champlain. The Stevens Branch basin encompasses roughly 115 sq. mi.(elevations ranging from 3000 feet to 500 feet), and the mainstem of the Stevens Branch itself includes roughly 14 miles of stream extending from its headwaters in the southeast corner of Williamstown to a downstream terminus at the confluence with the Winooski River mainstem on the southeast boundary of the Town of Montpelier. The Phase 2 assessment in 2008 included 6 reaches of the Stevens Branch, beginning in the south part of Barre City and extending upstream to the south part of Williamstown (5.28 miles); the first 5 reaches moving upstream on the Jail Branch from the confluence with the Stevens Branch in downtown Barre City (4.66 miles); and the two reaches comprising Honey Brook (1.93 miles), which enters the Jail Branch approximately 0.6 miles upstream from the confluence between the Jail and the Stevens.

The Winooski River headwaters begin in the Town of Cabot and the water flows 90 miles to Lake Champlain in Colchester. Draining approximately 1,080 square miles, the Winooski River watershed encompasses all of Washington County, about half of Chittenden County, and portions of Lamoille and Orange Counties. The 7 major tributaries of the Winooski River are the Little River, Kingsbury Branch, North Branch, Stevens Branch, Dog River, Mad River, and Huntington River. Over 70% of the Winooski River watershed is forested, and prominent land uses include agriculture (12%), transportation (5%) and developed land (4%). (http://www.anr.state.vt.us/dec/waterq/planning/htm/pl_winooskibasin.htm)

3.1.2 Political jurisdictions

Project reaches in the Stevens Branch basin are located in Barre City, Barre Town, and Williamstown. (Fig. 1). The drainage basin for these reaches also includes small portions of the towns of Orange and Washington. These towns lie within both Washington and Orange counties (Fig. 1 inset), and are all located within the region covered by the Central Vermont Regional Planning Commission.

3.1.3 Land use history and current general characteristics

A good brief background treatment of the overarching Winooski watershed has been prepared for the Winooski Valley Park District (NatureCompass 2009), including historical research that indicates a long period of Native American use of the area, with the Winooski River likely providing an important travel route through central Vermont between Lake Champlain and the Connecticut River. Historically the Winooski was used for the transportation of timber during a period of extensive logging in Vermont during

the 19th century. Though it is not documented that the Stevens Branch was also used for log transportation, the area was extensively cleared. During this same period, numerous mills sprang up along the river. The USDA Forest Service, in a background treatment and analysis of the Upper White River watershed area, denotes common patterns throughout much of Vermont that are also highly applicable for the Stevens and Jail Branches:

> " …low population densities and primarily non-intensive land use likely had minimal impact on the landscape. With the arrival of European immigrants, land-use and settlement patterns after the late 1700s had a more dramatic effect on the landscape and hydrology. "Land clearing, logging, altered stream channels, intensive agricultural practices, home building, and the establishment of road systems created the "classic" Vermont landscape of open hillsides, rural homesteads and stream-side roads and mills…" (USDA-FS 2001).

This analysis is consistent with photo documentation of the Stevens Branch valley (Fig. 2) available through the University of Vermont Landscape Change Program (http://www.uvm.edu/landscape/menu.php).

Figure 2. Pictures of the Stevens Branch valley a week after the 1927 flood (looking north) shows extensive areas of clearing in the valleys and portions of adjacent lower hillsides, even at this late date (relative to clearing of the land during the 1800s).

Many rivers were particularly affected by straightening and maintenance along valley walls when railroads were built along the rivers in the 19th century, frequently narrowing the valley width significantly and sometimes pinning the river between the valley wall and the bed on which the railroad was built. Within the project area, only the northern portion of the Stevens Branch mainstem was affected more by the railroad than roads, as the railroad crossed to the east of the road (away from the stream) upstream of the first study reach. Topographic maps from 1924 show both the road and railroad present in the valley (Fig 3). A 1957 topographic map no longer shows the railroad south of Barre City along Route 14, although it does show along the Stevens Branch north of Barre City and also in the City itself.

Though undocumented, it is conceivable that in the days of river transport of logs the Stevens Branch was straightened and periodically "snagged" (debris removed) to keep

the channels clean for efficient transport of logs to the rail line. Water flows on the Stevens and Jail Branches have also been significantly regulated, both historically and more recently, as evidenced by remnant dams and existing dams in the project area.

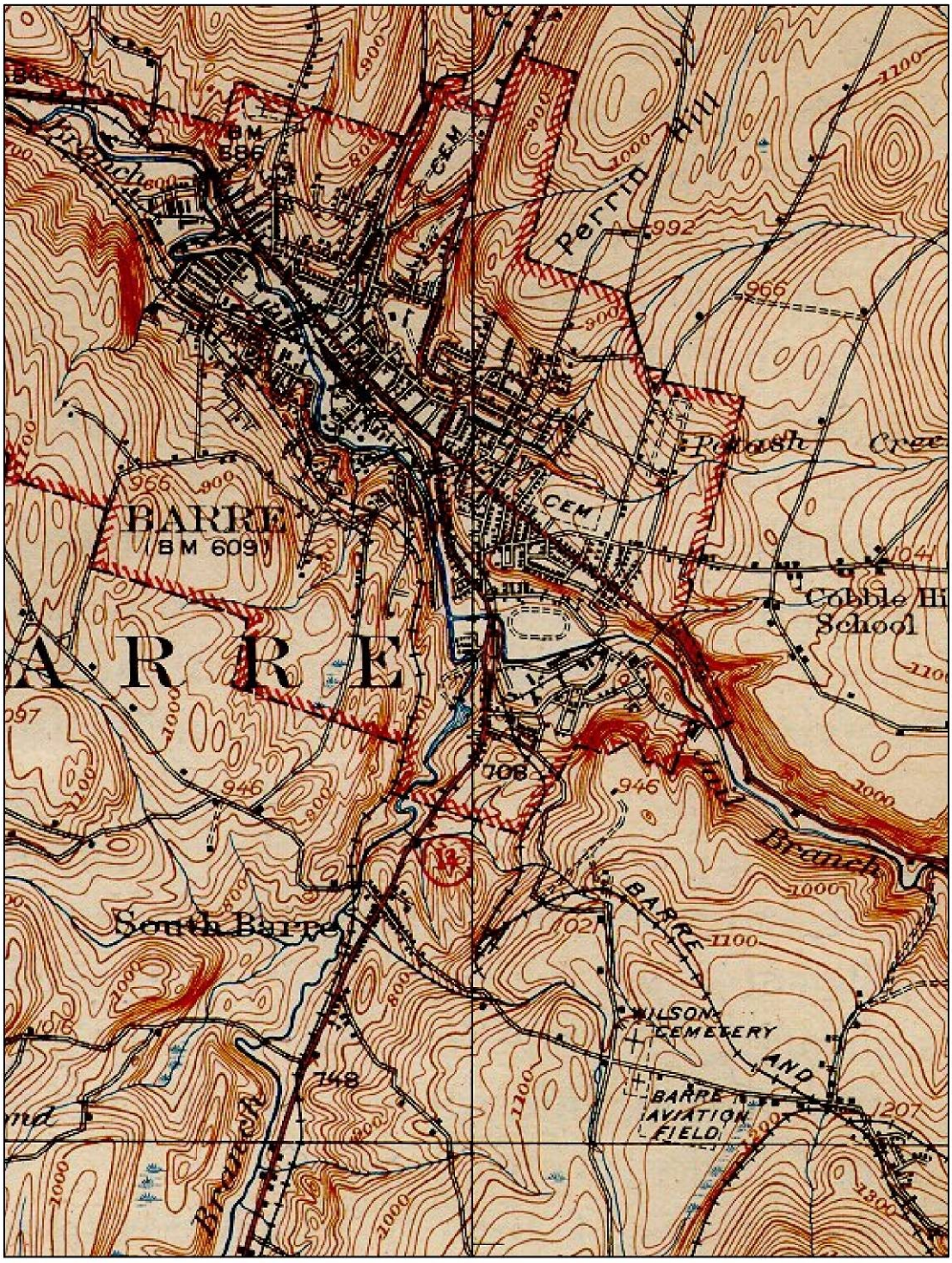

Figure 3: 1924 Topographic map of the confluence of the Stevens and Jail Branches, showing railroad development along the Stevens Branch mainstem and the lower Jail Branch.

According to 2002 land cover/land use analysis (UVM-SAL 2002), the Stevens Branch watershed in the early 21st century is nearly 64% forested, with roughly half of this comprised of broadleaf forest. (Fig. 4; Table 1). Agricultural land use in the watershed occupies roughly 16% of the land base, with roughly two-thirds of this included in cultivated row crop production. Roughly 9% of the overall watershed land use is comprised of combined residential, infrastructure, and commercial land uses (Table 1). Forested portions of the watershed are concentrated in the uplands on the eastern and western boundaries of the watershed, with central portions of the watershed exhibiting more intensive land uses.

Table 1. Stevens Branch watershed land cover/land use from satellite imagery analysis

Category	
Broadleaf forest (generally deciduous)	33%
Coniferous forest (generally evergreen)	15%
Mixed coniferous-broadleaf forest	16%
Forested wetland	2%
Nonforested wetland	1%
Water	9%
Row crops	10%
Hay/rotation/permanent pasture	5%
Other agricultural land	<1%
Residential	5%
Transportation, communication, and utilities	3%
Commercial, services, and institutional	<1%

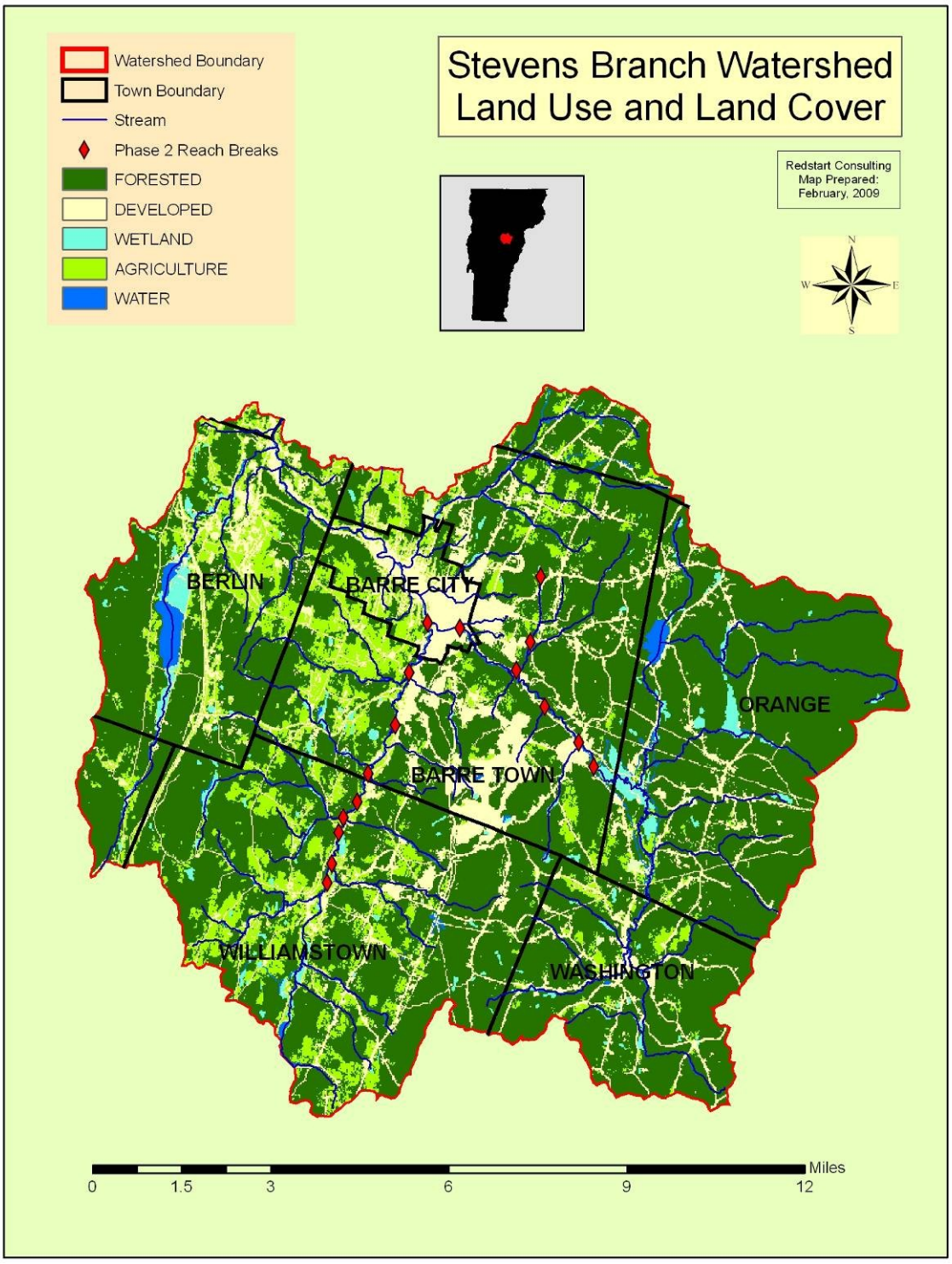

Figure 4: Land cover/land use analysis based on satellite imagery (UVM-SAL 2002) indicates moderate forest cover in the Stevens Branch basin, with agricultural and developed land comprising a significant portion of the land use as well, particularly in central portions of the watershed.

3.2 GEOLOGIC SETTING

Phase 2 assessment of the Stevens Branch watershed in 2004 included an excellent background overview of the formative processes in the study area:

> "The Stevens Branch watershed is flanked on the west by the Northfield Mountains, which parallel the Green Mountains, and the Barre granite to the east. Most of the watershed consists of metamorphic schists and phyllites of the Gile Mountain and the Barton River member of the Waits River Formations (Murthy, 1957). These rocks were deposited about 400 million years ago as muddy sediments in a warm tropical ocean. They were later altered by heat and pressure into metamorphic rocks around 350 million years ago. This alteration occurred during a collision of the old North American continent with another of the Earth's plates in a mountain-building event.
>
> Approximately 300 million years ago the continents were united in a large supercontinent called Pangaea. Around this same time, hotter, lighter rocks – now known as the Barre granite, began floating towards the surface. The bedrock in the east side of the watershed consists of the igneous Barre granite, which intruded into the metamorphic rocks. The tearing apart of Pangaea, and the creation of the Atlantic Ocean, began roughly 200 million years ago." (Barg 2004)

The Stevens Branch 2008 Phase 2 study area lies within the area described on basic bedrock delineations of Vermont as Silurian-Devonian bedrock (slate, phyllite, limestone, quartzite, conglomerate, greenstone, schist, amphibolite) with intrusions of granite and syenite (Fig. 5).

3.2.1 Surficial geology

In the Barre-Montpelier region almost all of the surficial materials owe their origin, either directly or indirectly, to the Laurentide ice sheet. The Laurentide ice sheet was the last big continental-scale glacier that covered all of New England. It first formed in the Hudson's Bay region of Canada sometime between 80–100,000 years ago. As the climate slowly cooled the ice sheet grew and advanced slowly towards New England, flowing south and east, up the Lake Champlain Valley and the many tributary valleys, including the Winooski River valley. As the ice sheet advanced and thickened it eventually overwhelmed and completely buried the Green Mountains (as well as the Adirondacks and White Mountains) and, by approximately 23,000 years ago, extended as far south as Long Island. Climate rapidly warmed and the ice sheet responded by thinning and retreating to the north leaving most of Vermont ice-free by approximately 14,000 years ago. (Wright and Larsen, 2004)

Several glacial lakes occupied the watershed. Glacial Lake Winooski (elevation 920 feet), drained south into the valley of the Second Branch of the White River through Williamstown Gulf. As the ice retreated to the north, a new lake - north-draining Lake Mansfield - filled the valleys of the Winooski and finally drained into glacial Lake Vermont through a spillway at Gillett Pond in Huntington (present elevation 750 feet).

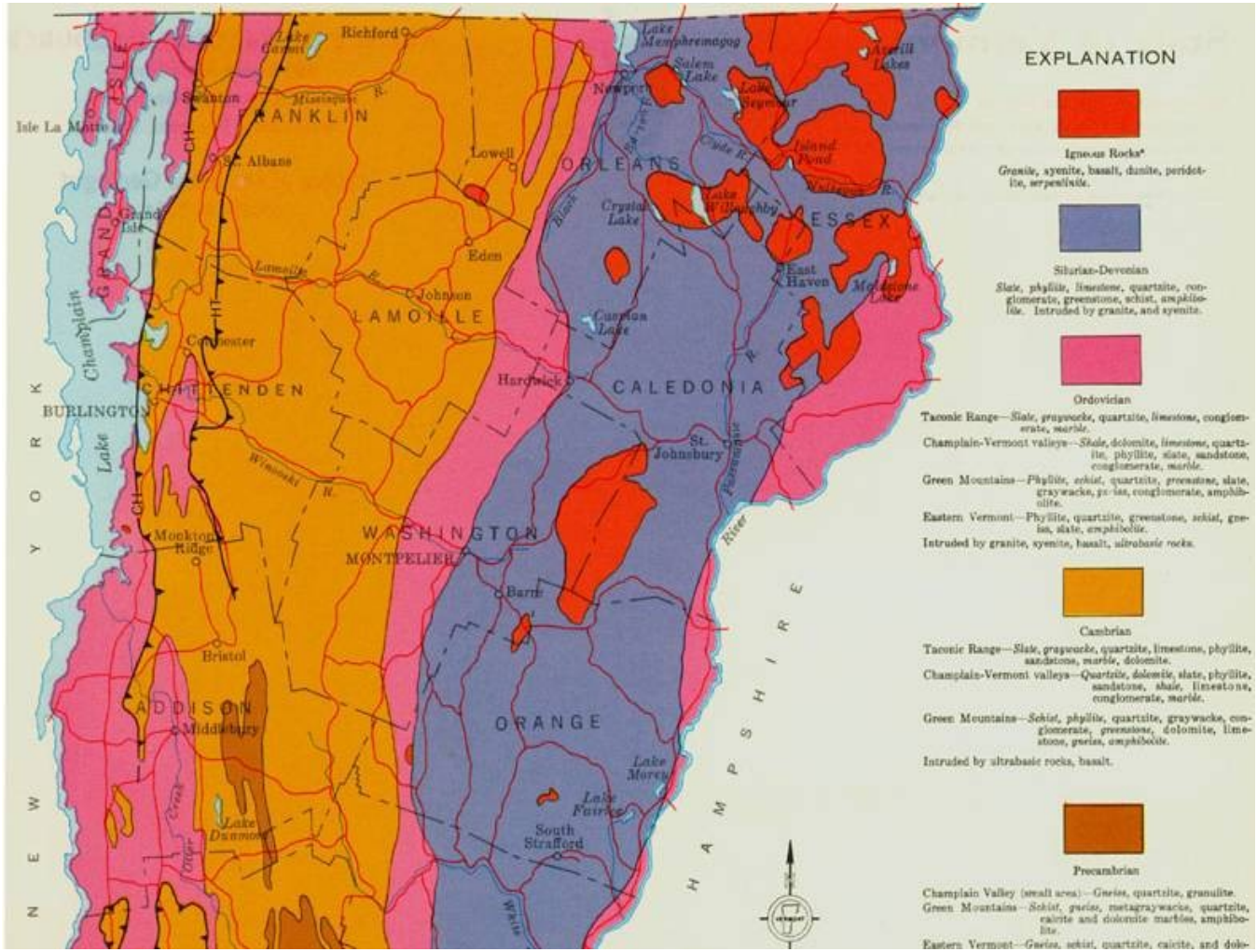

Figure 5: Bedrock geology map for central Vermont.

The Stevens Branch and its tributaries have reworked the glacial, glaciofluvial, and glaciolacustrine deposits that were left behind after the glacier melted. Many of the sediments left behind by glacial Lake Winooski have been washed out of the Stevens Branch valley. Some of the evidence of the presence of the glacier can be seen in the presence of the eskers, deltas, and abandoned stream terraces. Above approximately 920 feet in elevation (the elevation of Glacial Lake Winooski), the uplands are covered by glacial till, a mixed up combination of many different kinds of rock that was crushed under the weight of the glacier. This denser, thinner till has lower permeability and correspondingly lower flood storage and groundwater potential (Barg, 2004) (Fig 6).

3.2.2 Soils

The Stevens Branch has two main soil complexes. The valley bottoms are covered by the Colton-Buxton-Salmon series that form on sandy glaciofluvial and loamy glaciolacustrine deposits (NRCS, 2003). Hillsides and headwaters are dominated by glacial till soils such as DummerstonDummerston-Vershire, Tunbridge-Lyman, and Vershire-Glover complexes. These are well drained to moderately well drained soils. Soil formation is dependent on both the bedrock and the surficial geology. The calcium-rich waters of the ancient ocean left soils that support maple trees and rich woods on the Gile Mountain and Waits River Formations. Poorer, more acidic soils formed on the granite outcrops. The majority of mainstem reaches have well-drained NRCS hydrologic group A and B soils. Hydrologic group A soils have high permeability with high infiltration and low runoff grading to Hydrologic Group B soils which have high runoff and low infiltration (NRCS, 2003). Reach-level watershed and corridor geologic and soils details can be found in Table 2.

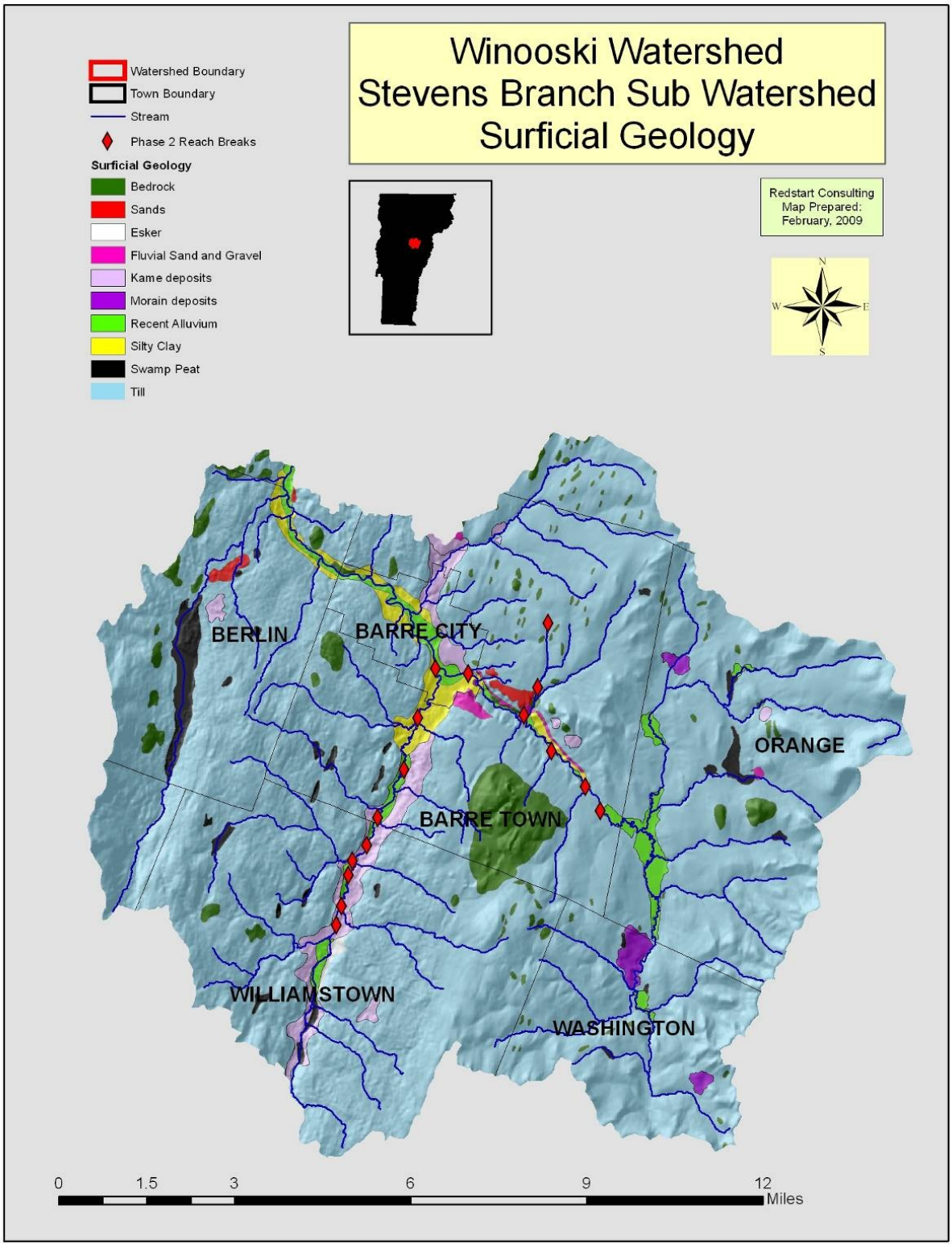

Figure 6: Surficial Geology in the Stevens Branch Watershed

Table 2. Stevens Branch watershed geology and soils for 2008 Phase 2 reaches (excerpted and combined from Phase 1, Step 3 (geology) and Step 3.5 (soils) analyses. "%" indicates the dominant portion of a soil complex characterized by the stated rating.

	Geologic Materials			Valley Sideslope		Soils	
Reach ID	**Dominant**	**%**	**Subdominant**	**Left**	**Right**	**Erodibility**	**%**
M1.10	Alluvial	69.0	Ice-Contact	Extremely Steep	Very Steep	Slight	2.0
M1.11	Alluvial	85.0	Ice-Contact	Extremely Steep	Very Steep	Slight	3.0
M1.12	Alluvial	67.0	Ice-Contact	Extremely Steep	Flat	Slight	14.0
M1.13	Ice-Contact	54.0	Alluvial	Extremely Steep	Extremely Steep	Moderate	42.0
M1.14	Alluvial	65.0	Glacial	Extremely Steep	Very Steep	Moderate	33.0
M1.15	Ice-Contact	47.0	Alluvial	Very Steep	Very Steep	Slight	12.0
M1.16	Ice-Contact	100	N/A	Very Steep	Very Steep	Very Severe	96.0
T3.01	Other	95.0	Glacial	Steep	Very Steep	Slight	4.0
T3.02	Glacial Lake	48.0	Ice-Contact	Extremely Steep	Extremely Steep	Severe	71.0
T3.03	Ice-Contact	81.0	Till	Extremely Steep	Extremely Steep	Moderate	38.0
T3.04	Till	82.0	Glacial	Hilly	Extremely Steep	Very Severe	99.0
T3.05	Other	51.0	Till	Hilly	Hilly	Moderate	48.0
T3.02S4.01	Till	81.0	Ice-Contact	Extremely Steep	Extremely Steep	Very Severe	82.0
T3.02S4.02	Till	99.0	N/A	Hilly	Hilly	Very Severe	99.0

3.3 GEOMORPHIC SETTING

For the purpose of geomorphic assessment and corridor planning, streams in the study area were divided into "reaches," fourteen of which are included in this report. A reach is a relatively homogenous section of stream, based primarily on physical attributes such as valley confinement, slope, sinuosity, dominant bed material, and bed form, as well as predicted morphology based on hydrologic characteristics and drainage basin size. Seven mainstem reaches of the Stevens Branch (M1.10-M1.16), five of the lowermost reaches of the Jail Branch (T3.01-T3.05), and two Honey Brook (tributary to the Jail Branch) reaches were chosen for inclusion. Table 3 outlines stream and valley details for the Phase 2 reaches.

Table 3. Reference stream types and geomorphic characteristics for Stevens Branch, Jail Branch and Honey Brook reaches included in 2008-09 corridor planning Project area.

Reach Number	Stream Type/ Bed Form *	Confinement (Valley Type)	Channel Slope (%)	Channel Length (ft)	Grade Controls
M1.10	E5/Dune Ripple	Very Broad	0.21	7264	None
M1.11	E5/Dune Ripple	Very Broad	0.23	6410	None
M1.12	E4/Riffle Pool	Very Broad	0.32	3125	None
M1.13	E4/Riffle Pool	Very Broad	0.37	2714	None
M1.14	E5/Dune Ripple	Very Broad	0.28	1812	None
M1.15	E4/Riffle Pool	Very Broad	0.34	4464	None
M1.16	B3/Step Pool	Narrowly Confined	3.56	2108	Ledge
T3.01	C4/Riffle Pool	Very Broad	0.86	3474	Ledge
T3.02	Bc3/Riffle Pool	Semi-Confined	1.71	7624	Ledge
T3.03	C3/Riffle Pool	Broad	1.63	5507	None
T3.04	B2/Step Pool	Semi-confined	2.16	5099	None
T3.05	Ba2/Step Pool	Narrowly Confined	5.21	2880	Dam
T3.02S4.01	A/Step Pool	Narrowly Confined	8.66	3233	Ledge
T3.02S4.02	Cb4/Riffle Pool	Narrow	3.31	6940	None

* See Appendix A for explanation of terms.

Table 4. Reference stream type classifications summary (VT ANR 2007 Phase 1 Protocols, p. 28).

Reference stream type	Confinement (Valley Type)	Slope
A	Narrowly confined (NC)	Very Steep: >6.5%
A	Confined (NC)	Very Steep: 4.0–6.5%
B	Confined or Semiconfined (NC, SC)	Steep: 3.0–4.0%
B	Confined, Semiconfined, or Narrow (NC, SC, NW)	Moderate–Steep: 2.0–3.0%
C or E	Unconfined (NW, BD, VB)	Moderate–Gentle: <2.0%
D	Unconfined (NW, BD, VB)	Moderate–Gentle: <4.0%

A longitudinal profile of the study area indicates gentle gradients along the lower reaches of the Stevens Branch mainstem, with increasing slopes beginning at the base of M1.16. Jail Branch reaches display a varying gradient, beginning in T3.01 with a gentle gradient, proceeding to the bottom of T3.02 with a steep gradient that flattens out again in the upper portions of T3.02 and continues at this gentle grade until T3.04. Honey Brook (T3.02S4.01) starts out with a steep gradient but levels out to a gentler slope at the top of the reach and continues through the next reach. Ledge grade controls are present in the areas of most extreme gradient change (M1.16, T3.02, T3.02S4.01). Although no alluvial fans were identified in either Phase 1 or Phase 2 assessments, it should be noted that Jail Branch reach T3.02 approaches the Stevens Branch mainstem valley very steeply, with erodible soils in the upstream reaches. Extensive development in Barre City may mask the presence of an alluvial fan at the base of the Jail Branch in reach T3.01.

3.4 HYDROLOGY

Hydrology is a function of how much rain falls, how much becomes surface flow that reaches the rivers, how much soaks into the ground to become groundwater (see discussion in Sec. 3.2, Geologic characteristics), how much is taken up by plants through evapo-transpiration (note particularly the forested portions of the watershed in Fig. 4 and Sec. 3.1.3 discussion on land use history and current general characteristics of the basin), and how much is evaporated into the air.

3.4.1 Stevens Branch Watershed StreamStats

The United States Geological Survey (USGS) administers a *StreamStats in Vermont* website, which is designed to help compute streamflow and drainage basin characteristics for ungaged sites (application description: http://water.usgs.gov/osw/streamstats/ssinfo.html; Vermont state application: http://water.usgs.gov/osw/streamstats/Vermont.html). Basin characteristics and stream peak flow statistics for the Stevens Branch drainage basin are summarized in Figure 7.

Basin characteristics for the Stevens Branch indicate a relatively small percentage of lakes and ponds in the basin (<1%), which when present provide storage and attenuation of flows within the watershed, but it should be noted that there are some significant wetlands and ponds in the headwaters portions of the basin (Fig. 8). Stream peak flow characteristics help in flood history comparison with other watersheds, which are further discussed below.

3.4.2 Stevens Branch watershed flood history

Although there is common acknowledgement of significant flood events in the Stevens Branch basin (Fig. 2 in this report is an aerial view one week after the 1927 flood), scientific documentation of impact levels throughout the basin is harder to obtain. There are two USGS stream gages in the Stevens Branch watershed, both in East Barre in the vicinity of the flood-control dam and strongly affected by flow regulation associated with that dam. In addition, the “Jail Branch at East Barre” gage (04284000) has a limited span of available data and has not operated since 1992; the “East Barre Detention Reservoir at East Barre, VT” gage (04283500) is primarily designed to monitor that reservoir, and available data focuses on water quality sampling.

Streamflow statistics are available from a USGS stream statistics interactive-map internet site where you can delineate the watershed you wish to investigate (see report below, Fig 7).

Streamflow Statistics Report for the Stevens Branch Sub basin

Date: Tue Mar 3 2009 13:39:43
Site Location: Vermont
Latitude: 44.2400
Longitude: -72.5497
Drainage Area: 115 mi2

Peak Flow Basin Characteristics			
100% Statewide Peak Flow (115 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	115	0.211	850
Percent Lakes and Ponds (percent)	0.89	0	6.86
Percentage of Basin Above 1200 ft (percent)	65.4	0	100
Geographic Factor (dimensionless)	184376.5	-87	296194

STREAM FLOW STATISTICS					
Statistic	**Flow (ft^3/s)**	**Prediction Error (percent)**	**Equivalent years of record**	**90-Percent Prediction Interval**	
				Minimum	**Maximum**
Q2	2770	42	1.4	1450	5310
Q5	4030	40	2.3	2130	7620
Q10	4940	41	3.2	2590	9410
Q25	6170	42	4.6	3220	11800
Q50	7130	43	5.5	3700	13800
Q100	8130	44	6.3	4090	16200
Q500	10600	49	7.6	4990	22600

*These are peak flow statistics, where $Qx = x$-year peak flood, i.e., maximum instantaneous flow that occurs on average once in x years

Figure 7. USGS StreamStats peak streamflow and basin characteristics statistics reports for the Stevens Branch drainage basin.

Bankfull flows typically occur every 1.25 - 2 years (Q2 in Fig. 7). These are the flows that move the most sediment, and are also known as “channel forming flows” (Leopold, 1973).

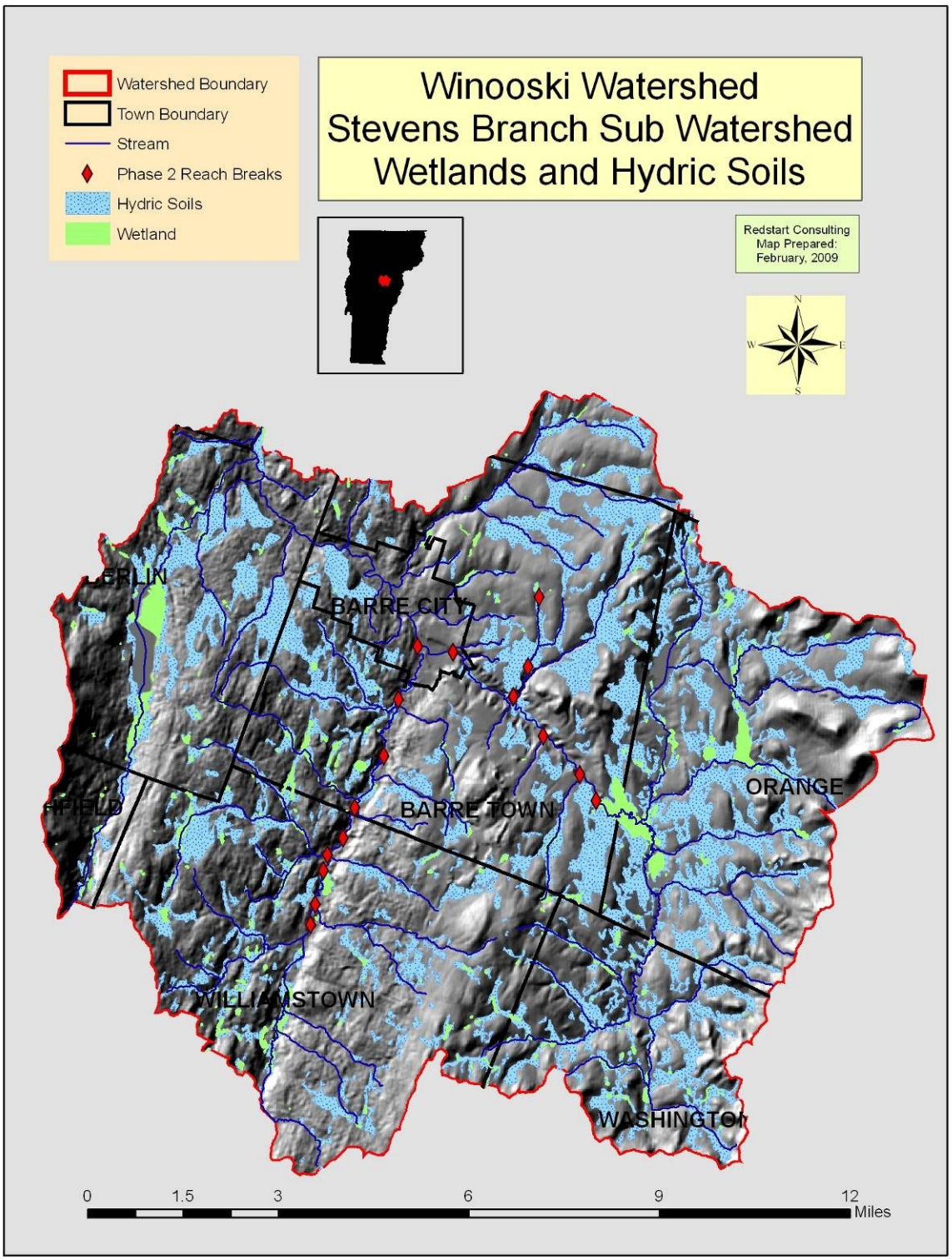

Figure 8: Wetlands and hydric soils map for the Stevens Branch Watershed

Lori Barg's 2004 assessment of the Stevens and Jail Branches specifically notes the profound influence of the East Barre Dam on the flood history and dynamics within this watershed:

> Data collected by the USGS show that of the nine largest floods in this century, there were two major floods in the 1970's, three in the 1980's and one in 2000 (Table 5)….
>
> *Five of the nine large floods occurred in the summer months associated with intense cloudbursts; two occurred in the fall associated with hurricanes; and two occurred in the spring associated with snowmelt. Flood flows usually occur after the soil has been saturated. Summer and fall floods are associated with greater flood damage than winter snowmelt floods. A study by the USGS of 400 gages from 1941 – 1999 found an increase in precipitation has occurred since 1970 due to a change in climate (McCabe, 2002). This has led to an increase in peak flood flows. The East Barre flood control dam (built in 1935) will reduce the amount of flow by about one-third and the depth of flooding by 4.5 feet in Barre if there was a flood similar to the 1927 flood.* (Barg 2004).

Table 5: Historical Flood information compiled for the Dog River and recalculated to relate to the Stevens Branch (Barg 2004).

Historical Floods	Return Frequency	Precipitation (in)	Peak discharge (Q) Dog River 1935 – 2002		Stevens * 35 Sq./Mi
			CFS	CFSM	CFS
July 1830	<100	>7(1)			
July 1850		5			
July 1858					
Oct. 1869	<100	4-6(1)			
April 1895		2-2.5 + snowmelt (1)			
Nov. 3 1927	>100	8.63 (4) (Northfield)			7300 (6)
March 17-18, 1936	7-10	4.87 Northfield	5700	74	2600
Sept. 22 1938	25	4.59 (3)	9750	127	4455
June 3, 1947		4.1 (1) Rutland	6450	84	2947
June 1, 1952			7140	93	32
June 30, July 1 1973	25	4.11 (2)	10600	138	4843
August 10-11, 1976	25	2.88 (5)	6680	87	3052
April 18, 1982		snowmelt	5550	72	2536
March 30- 31, 1987		1.58 (5)	7720	101	3527
August 5, 1989		6.72 (2)	8220	107	3756

Precipitation Data:
(1)The Vermont Weather Book Ludlum 1996
(2)NOAA National Weather-Montpelier Airport Station

(3) NOAA National Weather Service records for Northfield Station.
(4) USDA Weather Bureau Monthly Weather Review. Vol. 55 #11. November 1927. p496 - 497
Flow Data from USGS records
(5) Waitsfield daily precipitation records. Fred Spencer, Mountain View Inn
*Stevens Branch discharge calculated by multiplying Dog River CFSM *35.
(6) Flood Insurance Administration-1970

The next most reliable sources for gaged flood history that might relate to watershed-wide flood history in the Stevens Branch basin are found in two USGS gages located on the Mad and Dog Rivers. These watersheds are relatively close to the Stevens Branch watershed, and the drainage areas are somewhat smaller for the Dog River and somewhat larger for the Mad River (the USGS gage on the North Branch of the Winooski was not selected because flows are highly regulated by the dam at Wrightsville). Stream flow data for these two gaging stations are summarized in Tables 6 and 7 and Figures 9 and 10.

Table 6: DOG RIVER (at Northfield Falls): GAGE is water-stage recorder . DRAINAGE AREA: 76.1 mi².

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,600 ft³/s and (or) maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)
Jan 14	1515	1,890	4.94
Jan 18	1730	*5,780	*8.46
May 19	0145	3,010	6.20
May 19	2000	4,810	7.73
Jun 26	2330	2,460	5.64

Minimum 2008 discharge, 19 ft³/s, Oct 3, 6, 7, gage height, 0.79 ft.

Table 7: MAD RIVER (near Moretown): GAGE is water-stage recorder . DRAINAGE AREA: 139 mi².

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,400 ft³/s and (or) maximum (*):

Date	Time	Discharge (ft³/s)	Gage height (ft)
Oct 17	0815	6,340	9.10
Jan 14	1815	3,490	6.89
Jan 18	2130	*6,520	*9.23
May 20	0000	6,390	9.14
Jun 27	0145	4,800	7.95
Jul 13	0500	3,620	7.00

Minimum 2008 discharge, 37 ft³/s, Sep 28, 29, gage height, 2.62 ft.

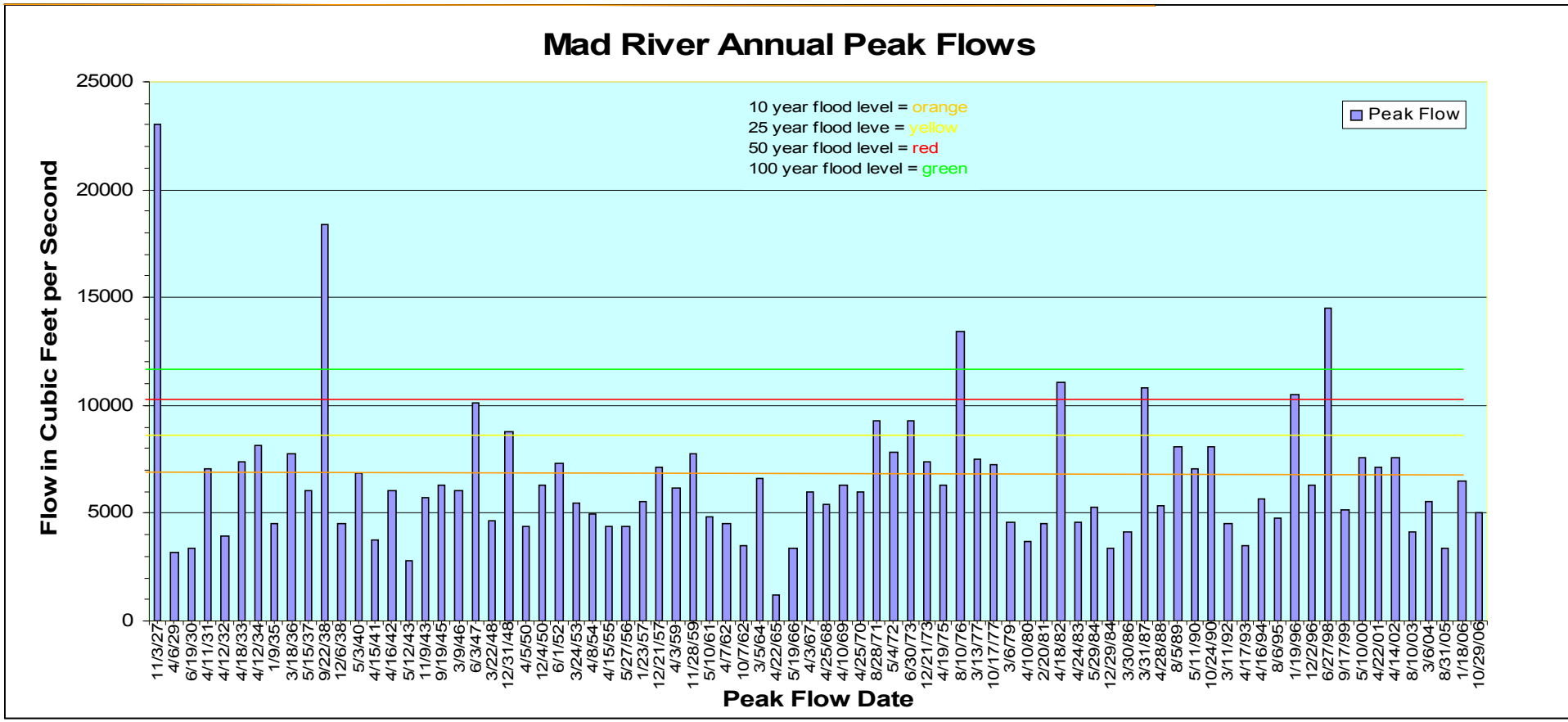

Figure 9: Annual peak flows at the Mad River gage, near Moretown, from 1927 to 2008

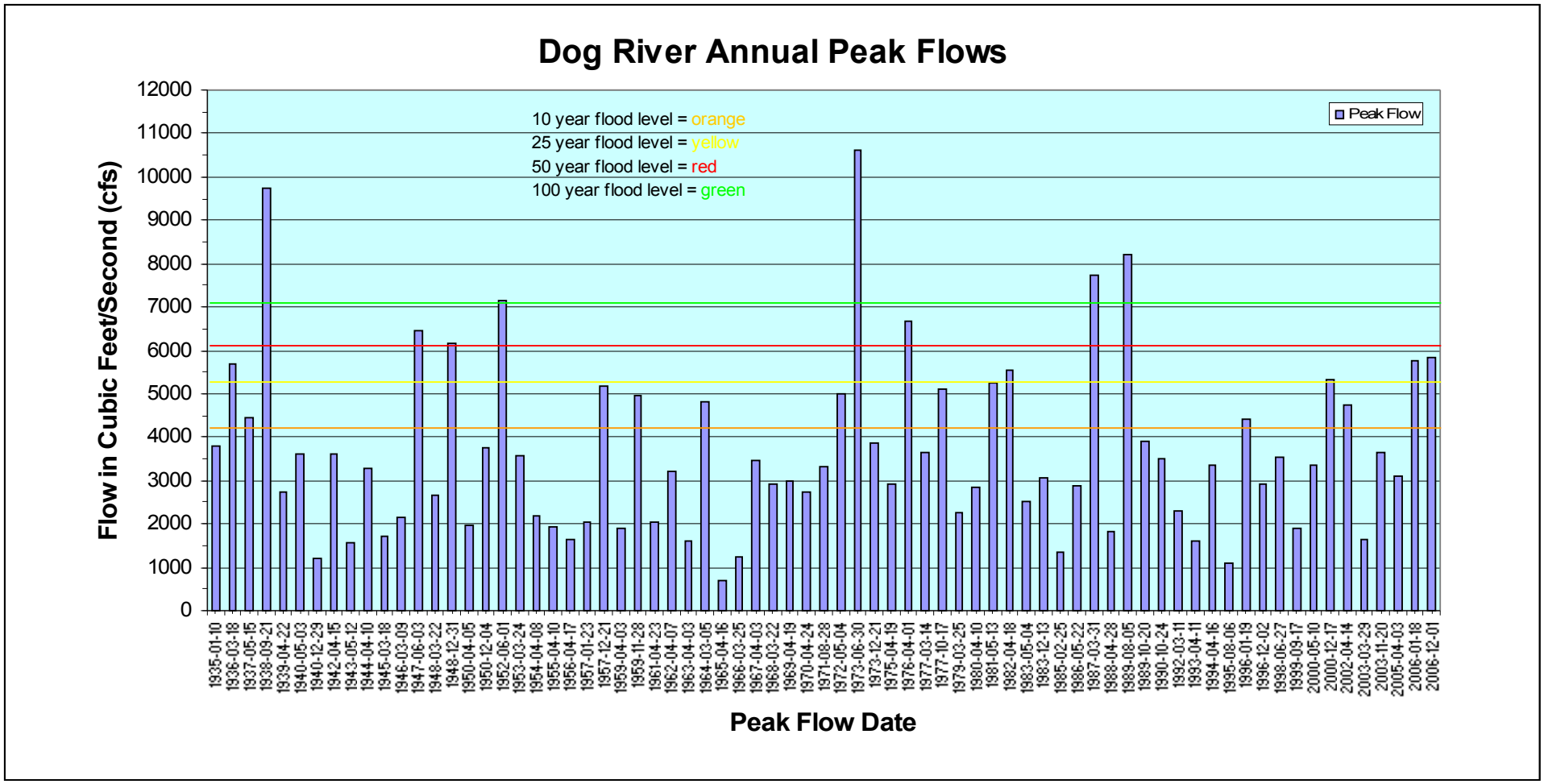

Figure 10: Annual peak flows at Dog River gage from 1935 to 2008.

Peak flows for 2008 were below the 10 year flood level on the Mad River and above the 25 year flood level on the Dog River, a characteristic indicator of the localized nature of many flooding events in Vermont.

The city of Montpelier, a short distance downstream on the Winooski from the Stevens Branch confluence, lists 3 significant flooding events in the last century **(**http://www.montpelier-vt.org/flood/floodguide.cfm**).**

1927: The 1927 flood was the most destructive hydrological event in Vermont's history. In the Winooski Valley, 55 deaths and $13.5 million in damage occurred. The flood destroyed many bridges and caused extensive structural damage to buildings.

1936: Heavy rains and moderate temperatures contributed to a large amount of run-off. Coupled with the breakup of thick ice, flooding occurred in the downtown after an ice-jam formed on the Winooski behind the old Bailey Dam.

1992: Due to sudden warm temperatures, the ice broke up along the Winooski River and an ice jam occurred just beyond the Bailey Avenue bridge. The water level quickly rose and flooded most of the City's downtown and some residences outside of the downtown. No deaths occurred; however, extensive damage occurred to buildings and through the loss of store inventories and records.

Barre has experienced similar flooding events over time. The 1927 flood that affected Montpelier also affected Barre (and all of Vermont). In July 2007 a series of thunderstorms striking Barre in quick succession caused flooding in the downtown area near the confluence of the Stevens Branch and Jail Branch (Fig 11).

Figure 11. July, 2007: Repeated thunderbursts caused extensive flooding in Barre City (credit Stefan Hard, Times Argus).

At the same time, there was flash flooding that occurred at the base of Honey Brook, which was repeated in 2008 (Fig. 12), and further up the Stevens Branch in the vicinity of Brockway Road.

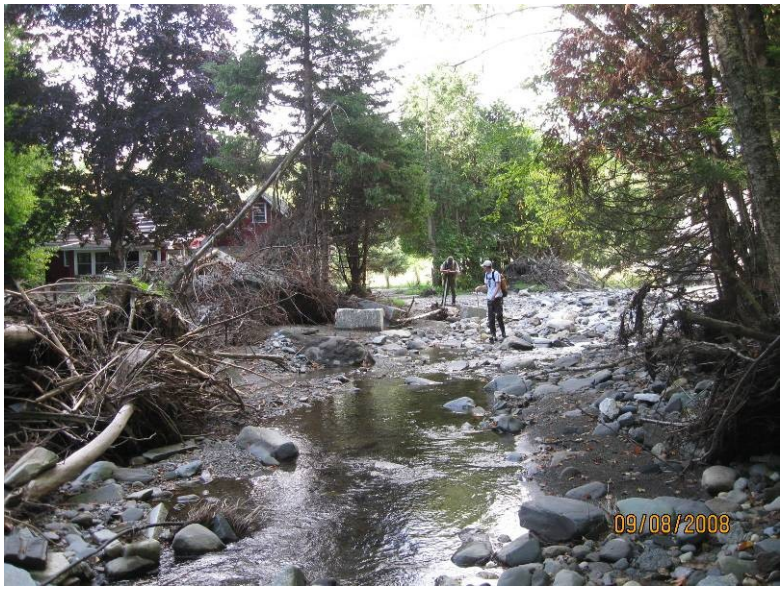

Figure 12. Flooding damage that occurred at the base of Honey Brook during July 2007 was repeated in 2008. In response, the house in the background was purchased and removed during fall 2008.

During field assessment work in 2008, there were several observations of new gully formation and mass failures in the watershed. This year (2008) included the third wettest summer in 114 years of record in much of Vermont (NRCC 2009) and record annual precipitation levels in nearby New Hampshire, with both high snow and rainfall throughout much of the northeast (NCDC 2009). In some instances these erosion features appeared un-related to any human-induced stressors. In reviewing the records at stream gages, it is important to recognize the sometimes localized nature of storms that can have significant flood and erosional impacts. While this is in part related to weather patterns, it is also important to recognize the impact of changes in hydrology over time, as further discussed in Section 5.1 (Watershed hydrologic stressors) of this report.

3.5 ECOLOGICAL SETTING

Most of the streams within the Winooski River watershed contain habitat that supports naturally reproducing (i.e.wild) trout populations. The cool, shaded mountain streams provide homes for wild brook trout, Vermont's only native stream trout. Larger tributaries and much of the Winooski River support naturalized populations of wild rainbow and brown trout. Both species were introduced to Vermont in the late 1800's; rainbows from the West Coast and brown trout from Europe. The Dog River has a reputation as one of the best wild rainbow and brown trout streams in the state. In addition to wild populations, "catchable" size trout are stocked in several of the larger tributaries and the main river. The Vermont Department of Environmental periodically updates their species lists for the Stevens and Jail Branches. Most recent data lists 12 fish species present in the Stevens and Jail Branches. One of the data collection sites is in the project area, 0.3 miles up the Jail Branch from the confluence. The list for both streams include Brook, Brown, and Rainbow Trouts, as well as species of Dace, Chub, Shiner, Minnow, Sucker, and

Sculpin. Anecdotal information (pers.comm. Colin McCaffrey, and Rich Langdon, 2009) suggests that there are some good sized wild brook trout to be found in both the Stevens and Jail Branches. In addition to fish, these streams support a multitude of other wildlife including many bird and mammal species.

Riparian habitat has been heavily influenced by human habitation in the last 200 years, with intensive agriculture and development largely occupying what would likely be floodplain forest habitats. Wetland habitats are fairly common in the watershed (Figure 8) and soils maps indicate that many riparian zones might have been classified as wetlands (hydric soils) before they were drained for agriculture and development.

4.0 METHODS

4.1 STREAM GEOMORPHIC ASSESSMENT

In an effort to provide a sound basis for decision-making and project prioritization and implementation, the Vermont Agency of Natural Resources has developed protocols for conducting geomorphic assessments of rivers. The results of these assessments provide the scientific background to inform planning in a manner that incorporates an overall view of watershed dynamics, as well as the reach-scale dynamics that have been a primary focal point of project planning in the past. Incorporating upstream and downstream dynamics in the planning process can help increase the effectiveness of implemented projects by addressing the sources of river instability that are largely responsible for erosion conflicts, increased sediment and nutrient loading, and reduced river habitat quality (VT ANR 2007). Trainings have been held to provide consultants, regional planning commissions, and watershed groups with the knowledge and tools necessary to make accurate and consistent assessments of Vermont's rivers.

The stream geomorphic assessments are divided into phases. A Phase 1 assessment is a preliminary analysis of the condition of the stream through remotely sensed data such as aerial photographs, maps, and "windshield survey" data collection. This phase of work identifies a "reference" stream type for each reach assessed. Phase 2 involves rapid assessment fieldwork to inform a more detailed analysis of what adjustment processes are taking place, whether the stream has departed from its reference conditions, and how it might continue to evolve in the future. This sometimes requires further division of "reaches" into "segments" of stream, based on such field-identified parameters as presence of grade controls, change in channel dimensions or substrate size, bank and buffer conditions, or significant corridor encroachments. River Corridor Plans analyze the data from the Phase 1 and 2 assessments to inform project prioritization and methodology. Phase 3 involves detailed fieldwork for projects requiring survey and engineering-level data for identification and implementation of management and restoration alternatives.

As noted in the Project Overview, Phase 1 Stream Geomorphic Assessment (SGA) for the Stevens Branch watershed was conducted in 2008. The Phase 2 SGA was initiated on the Stevens Branch, Jail Branch, and Honey Brook during the summer of 2008, with data collected by Redstart Consulting in conjunction with RMP river scientists, and with the

help from the Central Vermont Regional Planning Commission and Friends of the Winooski River. Phase 2 fieldwork was completed by the late fall of 2008. Field-collected data was processed and analyzed during the fall and winter of 2008-2009 and entered into the most current version of the VT ANR Stream Geomorphic Assessment Database (https://anrnode.anr.state.vt.us/ssl/sga/security/frmLogin.cfm), where it is available for public viewing. Phase 1 data were updated, where appropriate, using the field data from the Phase 2 assessment; these changes are tracked and documented within the SGA Database. Spatial data for bank erosion, grade control structures, bank revetments, debris jams, depositional features, and other important features were documented within all segments and entered into the spatial component of the statewide database (the Feature Indexing Tool, FIT) via the SGA Tool (SGAT) ArcView extension, which permits implementation of the data via geographic information systems. Maps displaying this information are available for public use as well. (http://maps.vermont.gov/imf/sites/ANR_SGAT_RiversDMS/jsp/launch.jsp).

4.2 QUALITY ASSURANCE, QUALITY CONTROL, AND DATA QUALIFICATIONS

Quality assurance/quality control (QA/QC) checks of the Phase 1 and Phase 2 data were carried out with procedures specified in the Phase 2 Protocols (VT ANR 2007b). Review by both River Management Program personnel and the consultants conducting the assessments were cross-checked to verify integrity of the data. Documentation of the quality control checks is maintained within the SGA database (https://anrnode.anr.state.vt.us/ssl/sga/security/frmLogin.cfm). General questions about data collection methods can be answered by referencing the SGA Protocols (VT ANR 2007b).

Full geomorphic Bridge and Culvert Survey data (VT ANR 2007b, Appendix G; data is viewable at https://anrnode.anr.state.vt.us/ssl/sga/structures.cfm) is not available for the full Phase 1 project area, but was collected for Phase 2 reaches during the 2008 field season in conjunction with other data collection. The importance of these structures in flow and sediment transport dynamics makes this data extremely valuable for a more complete picture of watershed dynamics, as well as important information for structure maintenance and replacement prioritization, scheduling, and capital budgeting.

5.0 RESULTS

The following sections summarize pertinent results of Phase II SGA data collection for the Stevens Branch watershed. Stressor, departure, and sensitivity maps are presented as a means to integrate the data that have been collected and show the interplay of watershed and reach-scale dynamics. These maps should assist in identifying practical restoration and protection actions that can move the river toward a healthy equilibrium (VT ANR 2007). Alterations to watershed-scale hydrologic and sediment regimes can profoundly influence reach-scale dynamics, and greater understanding of these processes is vital to increasing the effectiveness of protection and restoration efforts at a reach level (VT ANR 2007). Section 5.1 presents an analysis of stream departure from reference conditions. Sections 5.1.1 and 5.1.2 summarize watershed-scale stressors contributing to

current stream conditions, and Sections 5.1.3–5.1.6 characterize reach-scale stressors. Section 5.1.7 characterizes the hydrologic and sediment regime departures for reaches included in Phase 2 assessment within the Stevens Branch watershed. Section 5.2 presents a sensitivity analysis of these reaches, indicating the likelihood that a stream will respond to a watershed or local disturbance or stressor and an indication of the potential rate of subsequent channel evolution (VT ANR 2007b, Phase 2, Step 7.7; VT ANR 2007, Section 5.2).

Data used for the analyses can be found in the appendices. Phase 1 Reach summary statistics and channel geometry data are found in Appendix C. Reach/segment scale data from Phase 2 fieldwork are provided as summary sheets in Appendix D. Plots of channel cross sections are found in Appendix E.

5.1 DEPARTURE ANALYSIS

5.1.1 Watershed-scale hydrologic regime stressors

The hydrologic regime involves the timing, volume, and duration of flow events throughout the year and over time; as addressed in this section, the regime is characterized by the input and manipulation of water at the watershed scale. When the hydrologic regime has been significantly changed, stream channels will respond by undergoing a series of channel adjustments. Where hydrologic modifications are persistent, the impacted stream will adjust morphologically (e.g., enlarging through either downcutting or widening when stormwater peaks are consistently higher) and often result in significant changes in sediment loading and channel adjustments in downstream reaches (VT ANR 2007).

As noted in Sec. 3.1.2 on land use history and current general characteristics, the Stevens Branch watershed today is roughly 64 % forested. Limited field observations of current forest species and age distributions indicate that the Stevens Branch watershed likely experienced extensive areas of deforestation, similar to the majority of the Vermont landscape during the 1800s. Changes in hydrology accompanying this extensive clearing included higher peak flows and direct-runoff discharges, lower minimum flows, and significant inputs of sediment. A reduction in peak flows and higher minimum flows gradually returned with reforestation through the 20th century (USDA-FS 2001).

Roads, parking lots, construction areas, lawns, and similar land uses are broadly classed in remote-sensing data from aerial imagery (Phase 1 data; Fig. 5) under “urban” land uses, which can reduce infiltration capacity and hence attenuation of flows as well as increase direct stormwater inputs to the stream. These land uses are significant in the Stevens Branch basin, particularly within the riparian corridor towards the base of the watershed.

The urban landscape dominates the stream corridor that corresponds to the reaches in this study area (Fig. 13), where 8 of 14 reach corridors have urban land use as a dominant category.

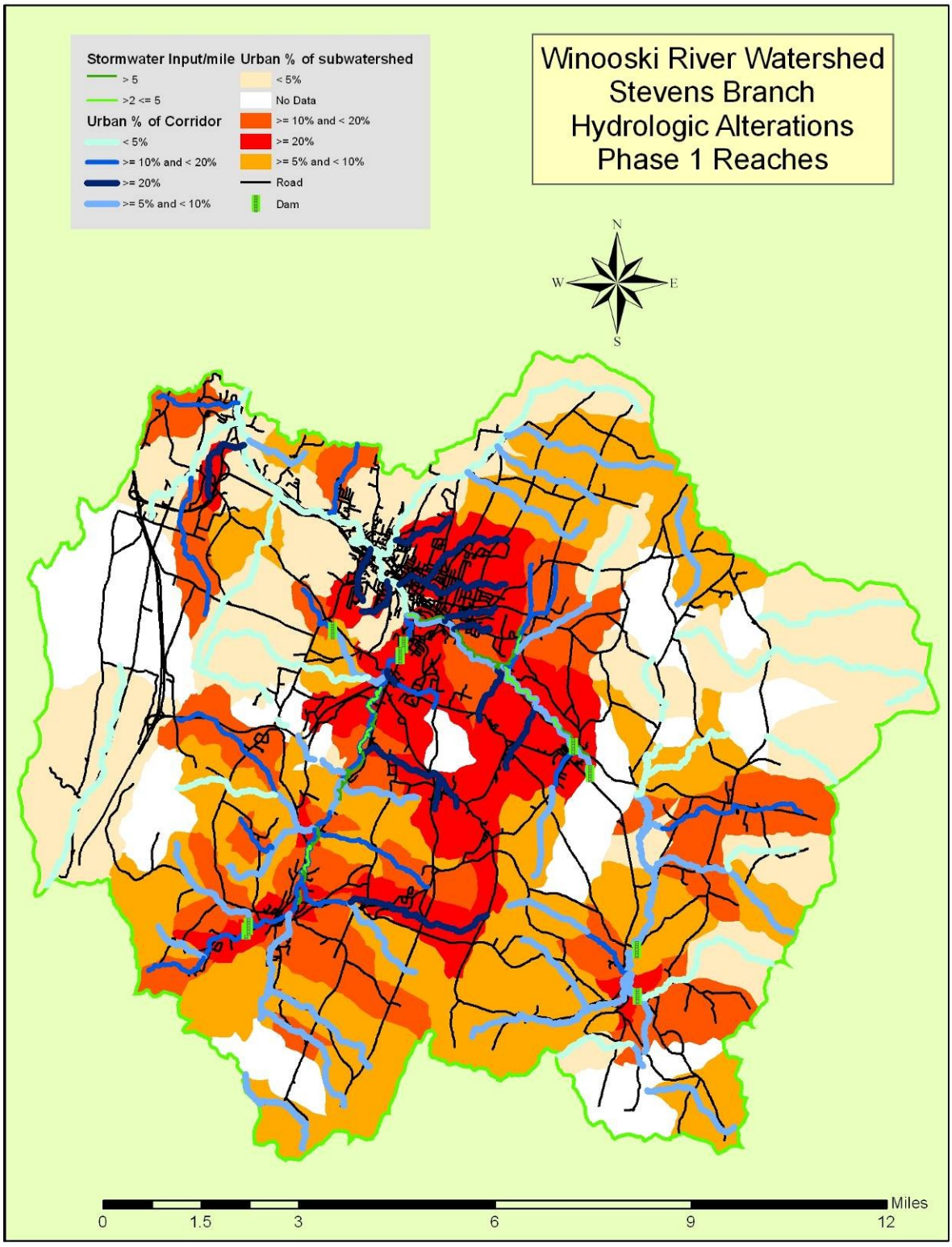

Figure 13: Hydrologic alterations for the entire Stevens Branch Watershed.

Of these stream reaches all have at least 25% in urban uses. Of the remaining 6 reaches, four have urban uses as a subdominant category. One reach is dominated by cropland with field as subdominant. The upper reach of Honey Brook is dominated by forest, with wetland subdominant. In addition to the one reach that is dominated by cropland , this land use type occurs as a subdominant category for four reaches. Agricultural areas can generate considerable inputs of overland runoff as well as sediment (particularly if bare soil is exposed) during significant precipitation events. Phase 1 and 2 geomorphic assessment indicated that many roads and crop lands near the streams have been ditched over time, further contributing to intensified hydrologic inputs to streams. Analysis of hydric soils overlaid with current crop and developed land use (Fig. 8) indicates some likely loss or impairment of wetland attenuation of precipitation inputs in the Stevens Branch watershed. Lack of baseline historical data makes it difficult to quantify and establish impact thresholds for this parameter.

Historical clearing throughout much of Vermont in the late 18th and 19th centuries initially contributed to higher runoff of both water and sediment, which accrued in the river valleys. Removal of large woody debris from stream channels, often related to use of streams for log drives, mill power, and agricultural uses, frequently combined with road development and other encroachments, channel straightening, and bank armoring to change the rainfall-runoff regime in such a way that water inputs and power intensified through deposited sediments. Hydrologic regimes became more "flashy" as streams cut downward in areas where the stream bed was erodible, and greater stream flows were consequently contained within the channel (VT ANR 2007).

Although it is difficult to quantify the extent of hydrologic changes due to deforestation, the active role of trees as "pumps" helping to cycle water and thus moderate both the amount and timing of water delivered to a stream system should not be underestimated. While this situation tended to diminish with reforestation, channel enlargement indicated by both current and historical channel incision, as well as current widening, were noted in Phase 2 data collection for the Stevens Branch watershed. Although much of the watershed is reforested today, the legacy of deforestation forms a backdrop that often exacerbates or otherwise influences adjustment processes evidenced in the assessed streams.

It is not clear how much of the Phase 2 study reaches might have been used for the running of logs during the peak of river-transport days, but parts of the Stevens Branch are straightened and near rail road lines, so it is possible that the Stevens was used in this way. Old mill sites were in evidence on reach M1.16 and at the top of T3.02. There is still a dam, although it has been breached, at the top of reach T3.04, and the flood control dam is, of course, dominating the top of reach T3.05. In areas of log-running and mill activities, a common practice of "snagging", or removing coarse woody debris, was used to keep channels clear and regulate flows. These practices would increase the erosive power of water at release times, further abetted by a reduction in the amount of sediment being moved by that water if the sediment was being held at dams and other constrictions.

In this project area, particularly along the Jail Branch, human activities might have revolved more around the transport of granite from East Barre to Barre City and

Montpelier. Barre City may be built on an alluvial fan created by the Jail Branch as it entered the Stevens Branch valley. The Jail Branch valley included development for the growing city and housing for granite quarry workers, and granite has often been used as fill along Route 302 to allow for roadside development. In many areas floodplain access has been severely limited by the presence of fill. In these areas, high volume flows are now contained within the channel and smaller precipitation events can generate levels of geomorphic impact previously associated with more extreme precipitation events. Under these conditions, thunderstorms and microbursts, mid-winter rains, and snow melt events can cause significant hydrologic impacts (USDA-FS 2001).

5.1.2 Watershed-scale sediment regime stressors

The following description of issues related to the sediment regime is taken from the most current version of the VT ANR River Corridor Planning Guide (VT ANR 2007):

> The sediment regime may be defined as the quantity, size, transport, sorting, and distribution of sediments. Sediment erosion and deposition patterns, unique to the equilibrium conditions of a stream reach, create habitat. Generally, these patterns provide for relatively stable bed forms and bank conditions…
>
> ….During high flows, when sediment transport typically takes place, small sediments become suspended in the water column. These wash load materials are easily transported and typically deposit under the lowest velocity conditions, which exist on floodplains and the inside of meander bendways at the recession of a flood. When these features are missing or disconnected from the active channel, wash load materials may stay in transport until the low velocity conditions are encountered….This … unequal distribution of fine sediment has a profound effect on aquatic plant and animal life. Fine-grained wash load materials typically have the highest concentrations of organic material and nutrients.
>
> Bed load is comprised of larger sediments, which move and roll along the bed of the stream during floods…. The fact that it takes greater energy or stream power to move different sized sediment particles results in the differential transport and sorting of bed materials….When these patterns are disrupted, there are direct impacts to existing aquatic habitat, and the lack of equal distribution and sorting may result in abrupt changes in depth and slope leading to vertical instability, channel evolution processes, and a host of undesirable erosion hazard and water quality impacts.

At a watershed scale, the Stevens Branch basin contributes to both a high bed load and a high wash load system. Phase 1 analysis indicated that bedrock geology of the watershed is dominated by fluvial, ice-contact and till substrates (though some of these tills are very fine-grained, especially on Honey Brook), often with steep to extremely steep valley wall topography (see Section 3.2, Geologic background, of this report). In addition, soil data from the Phase 1 analysis indicates similar contributions to a high wash load, as 9 of the 14 reaches assessed showed soils with “Moderate”, “Severe”, and “Very severe” erodibility ratings (Section 3.2).

Sediment load indicators catalogued during the Phase 2 assessment process are illustrated in Fig 14. Extensive mass failures over 100 feet in height located on the north side of the Jail Branch reach T3.04, between Rte. 302 and Cobble Hill Rd., have the potential to add enormous amounts of sediment into the system. This unusual area is underlain by a clay layer beneath 100-200 feet of sands, with a thin layer of till on the top. Water percolating

through the sands hits the clay layer and moves laterally toward daylight. This creates a chronically de-stabilizing effect where the water daylights and creates a great potential for mass failures.

Geomorphic instability related to the downcutting of streambeds in the Stevens Branch basin (and loss of floodplain access), has lead historically, and to some extent is still leading, to the concentration of flows in the stream channel, increased stream power, and the redistribution of fine sediment loads further downstream in the system. Because this process is largely historic in the Stevens Branch, most areas assessed in 2008 exhibited more widening and aggradation, a process that instead reduces stream power and causes sediments to drop out without moving further downstream. Additional stressors common in this system would include sheet and gully erosion on exposed soils of construction areas and tilled croplands in the river corridor in particular, as well as both field and road ditching systems and overland flows that transport sediments easily in runoff events.

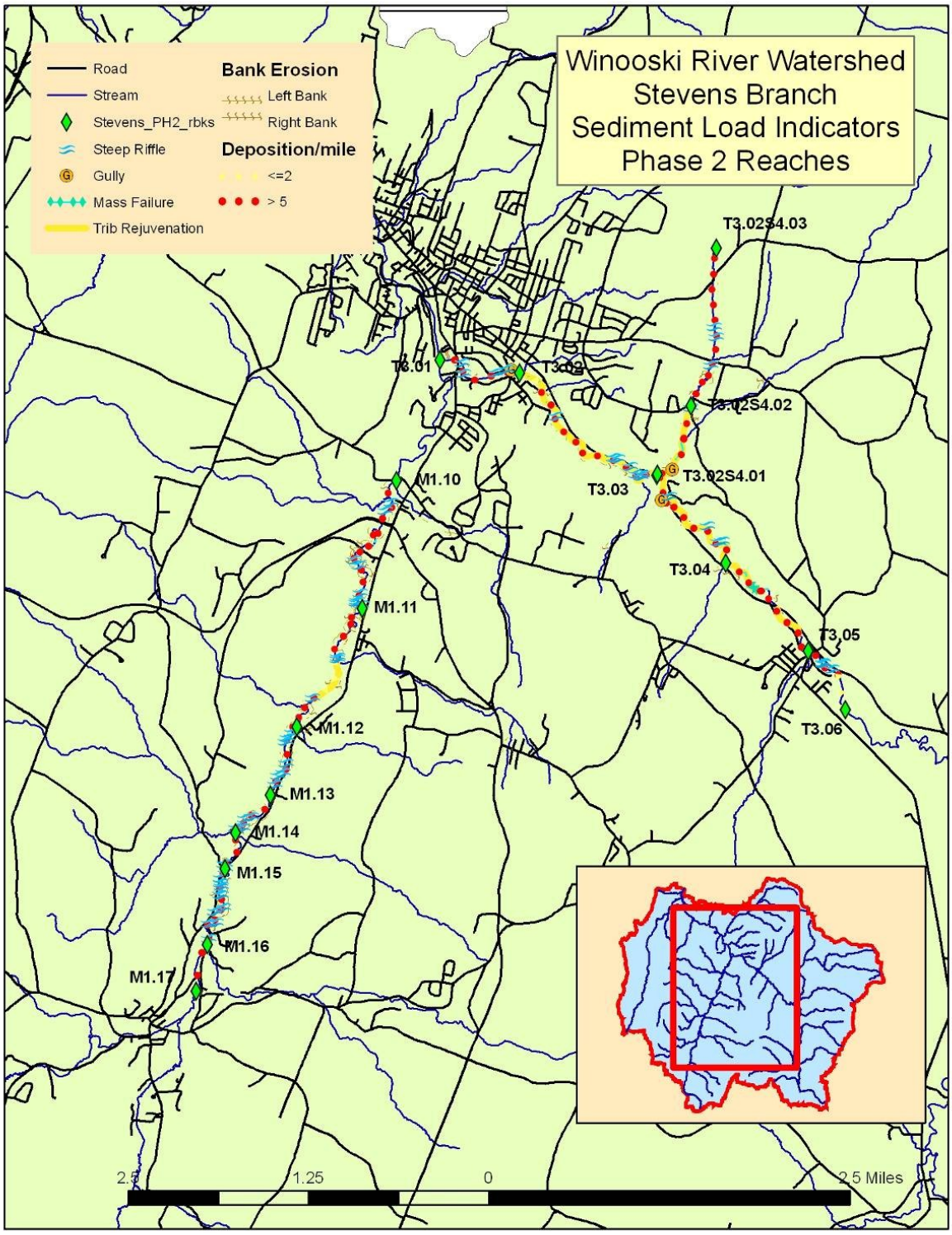

Figure 14: Sediment Load Indicators for Phase 2 study reaches.

5.1.3 Reach-scale stressors

Watershed-scale stressors form a hierarchical pretext for understanding the timing and degree to which reach-scale modifications are contributing to field-observed channel adjustments (VT ANR 2007). Modifications to the valley, floodplain, and channel, as well as boundary (bank and bed) conditions, at the reach scale can change the hydraulic geometry, and thus change the way sediment is transported, sorted, and distributed (Table 4). Phase 1 and Phase 2 assessments provide semi-quantitative data-sets for examining stressors and their effects on sediment regime when channel hydraulic geometry is modified .

Table 4. Reach level stressors: relationship of energy grade and boundary conditions in sediment transport regime (VT ANR 2007).

		Sediment Transport Increases	Sediment Transport Decreases
	Stream power as a function of:	**Stressors that lead to an increase in power**	**Stressors that lead to a decrease in power**
Energy Grade	**Slope**	• Channel straightening, • River corridor encroachments, • Localized reduction of sediment supply below grade controls or channel constrictions	• Upstream of dams, weirs, • Upstream of channel/floodplain constrictions, such as bridges and culverts
	Depth	• Dredging and berming, • Localized flow increases below stormwater and other outfalls	• Gravel mining, bar scalping, • Localized increases of sediment supply occurring at confluences and backwater areas
Boundary Conditions	**Resistance to power by the:**	**Stressors that lead to a decrease in resistance**	**Stressors that lead to an increase in resistance**
	Channel bed	Snagging, dredging, and windrowing	Grade controls and bed armoring
	Stream bank and riparian	Removal of bank and riparian vegetation (influences sediment supply more directly than transport processes)	Bank armoring (influences sediment supply more directly than transport processes)

The primary hydrologic and sediment stressors in each stream segment assessed in the 2008 Phase 2 assessment of the Stevens Branch watershed are identified in Table 5. Channel Slope (Figs. 15 & 16) and Depth Modifier Maps (Figs. 17 & 18) (Sections 5.1.4 and 5.1.5, respectively) can be used to determine whether stream power has been significantly increased or decreased. A Channel Boundary and Riparian Modifiers Map

(Figs. 19 & 20)(Section 5.1.6) can help explain whether the resistance to stream power has been increased or decreased.

Table 5. Stevens Branch Watershed Stressors Identification tables indicating some of the hydrologic and sediment load stressors that are likely causing or contributing to channel adjustment and a departure from equilibrium conditions (Appendix A and section 5.1.4)

StevensBranch mainstem *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification St**	
Stream segment	**Hydrologic**	**Sediment load**	**Energy grade**	
M1.10A	*Increased flows* Historic Deforestation Extensive wetland conversion Agricultural Use Urbanization Roads and ditching Trib inputs P1 Watershed: 58% Forest, subdom= Urban P1 Corridor: 65% Urban; subdom = crop.	*Increased load* Trib inputs Stream Bank Erosion in reach (5-10%) and upstream Mass Failures in M1.10B P2 deposition range: >5/mi P2 sum steep riffles & midbars =2	*Increased stream power: slope* Straightening: 30% Encroachment: >20% 1 surface water input *Decreased stream power: slope* P2: deposition range >5/mi	*D Su *D Su Er *In Ba
M1.10B	*Increased flows* Historic Deforestation Some wetland conversion Ongoing Agricultural Use Urbanization Roads and ditching P1 Watershed: 58% Forest, subdom= Urban P1 Corridor: 65% Urban; subdom = crop)	*Increased load* Mass failures Stream bank erosion P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 9	*Increased stream power: slope* Straightening: 15% Encroachment: 5-20% 4 Stormwater inputs *Decreased stream power: slope* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars: >9 Deposition in vicinity of bridges	*D Su *D Su Er RE *In Ba ba
M1.10C	*Increased flows* Historic Deforestation Ongoing Agricultural Use Urbanization Roads and ditching P1 Watershed: 58% Forest, subdom= Urban P1 Corridor: 65% Urban; subdom = crop	*Increased load* Stream bank erosion P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 4	*Increased stream power: slope* Straightening: >50% Encroachment: >20% 2 Stormwater inputs	*D Er RE Do RE *In Ba
M1.10D	*Increased flows* Historic Deforestation	*Increased load* Tributary input of sediment	*Decreased stream power: slope*	*D Su

StevensBranch mainstem *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification St**	
Stream segment	**Hydrologic**	**Sediment load**	**Energy grade**	
	Ongoing Agricultural Use Urbanization Roads and ditching Tributary input P1 Watershed: 58% Forest, subdom= Urban P1 Corridor: 65% Urban; subdom = crop.	Stream bank erosion P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 4	P2: deposition range: >5/mi *Increased stream power: slope* Encroachment:>20% 2 Stormwater inputs	*D Su Er 5-1
M1.11A	*Increased flows* Historic Deforestation Ongoing Agriculture Urbanization Roads and ditching P1 Watershed: 60% Forested, subdom = Urban P1 Corridor: 24% Crop, subdom = Field	*Increased load* Stream bank erosion P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 12	*Increased stream power: slope* Straightening: < (but almost) 50% 2 Stormwater inputs *Decreased stream power: slope* P2 deposition range: >5/mi Bridge constriction with dep below and above	*D Su Er Su
M1.11B	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching P1 Watershed: 60% Forested, subdom = Urban P1 Corridor: 24% Crop, subdom = Field	*Increased load* Trib rejuvenation	*Increased stream power: slope* Straightening: >50% 7 Stormwater inputs *Decreased/increased stream power: slope* Bridge constriction with dep below, scour above	*D *D Do *I RF
M1.11C	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching P1 Watershed: 60% Forested, subdom = Urban P1 Corridor: 24% Crop, subdom = Field	*Increased load* P2 deposition range: >5/mi Sum steep riffles and mid-bars = 4	*Increased stream power: slope* Straightening: >20% Encroachment: >20% RB 3 Stormwater inputs Old abutment constriction with scour up and downstream *Decreased stream power: slope* P2 deposition range: >5/mi	*D Er Su
M1.12A	*Increased flows* Deforestation Ongoing Agriculture Urbanization	*Increased load* Bank erosion 10-25% both banks P2 deposition range: >5/mi	*Increased stream power: slope* Straightening: >20% Encroachment: >20% one bank 3 Stormwater inputs	*D Er RF Do

StevensBranch mainstem *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification St**	
Stream segment	**Hydrologic**	**Sediment load**	**Energy grade**	
	Roads and ditching P1 Watershed: 61% forested, subdom = crop P1 corridor: 36% urban, subdom = crop.	Sum steep riffles and mid-bars = 8	Scour above bridge *Decreased stream power: slope* P2 deposition range: >5/mi Deposition below bridge	*I Ba ba
M1.12B	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching P1 Watershed: 61% forested, subdom = crop P1 corridor: 36% urban, subdom = crop.	*Increased load* P2 deposition range: >5/mi Sum steep riffles and mid-bars = 4	*Increased stream power: slope* Straightening: >50% Encroachment = 100% 2 stormwater inputs	*D Do *I 20
M1.13	*Increased flows* Deforestation Ongoing Agriculture Roads and ditching P1 Watershed: 61% forested, subdom = crop P1 corridor: 27% forest, subdom = urban	*Increased load* P2 deposition range: >5/mi Bank Erosion >20% RB Mass Failures Sum steep riffles and mid-bars = 11	*Increased stream power: slope* Straightening: >20% Encroachment: >50% one bank 1 stormwater input *Decreased stream power: slope* P2 deposition: >5/mi	*D Er Su
M1.14	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching P1 Watershed: 57% forested, subdom = field P1 corridor: 42% urban, subdom = forest	*Increased load* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars: = 6	*Increased stream power: slope* Straightening: >50% Encroachment: >50% 2 stormwater inputs *Decreased stream power: slope* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars: >5 Deposition above and below bridge	*D Do do *I Ar
M1.15A	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching	*Increased load* P2 deposition range: >5/mi P2 sum steep riffles and mid-bars = 19 Bank erosion >20% both banks	*Increased stream power: slope* Straightening: 10-25% Encroachment: >50% 3 stormwater inputs	*D *D Er Do *I

StevensBranch mainstem *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification St**	
Stream segment	**Hydrologic**	**Sediment load**	**Energy grade**	
	P1 Watershed: 56% forested, subdom = field P1 corridor: 27% urban, subdom = crop		*Decreased stream power: slope* P2 deposition range: >5/mi P2 sum steep riffles and mid-bars >5	Ba 5–
M1.15B	*Increased flows* Deforestation Ongoing Agriculture Urbanization Roads and ditching Major trib input P1 Watershed: 56% forested, subdom = field P1 corridor: 27% urban, subdom = crop	*Increased load* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars: 4 Trib inputs of sediment	*Increased stream power: slope* Straightening: >50% Encroachment: >50% 1 stormwater input *Increased stream power: depth* Dredging likely after 2008 flooding *Decreased stream power: slope* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars: 2–5 Depostion above and below bridge	*D Do *In Ba 5–
M1.16A	*Increased flows* Deforestation Roads and ditching P1 Watershed: 57% forested, subdom = field P1 corridor: 36% urban, subdom = forest	*Increased load* P2 deposition range: >5/mi	*Increased stream power: slope* Encroachment: >50% Scour above bridge *Decreased stream power: slope* P2 deposition range: >5/mi Deposition below bridge	*In 1 l *In Ba ba
M1.16B	Not assessed	Not assessed	Not assessed	No
M1.16C	*Increased flows* Deforestation Roads and ditching P1 Watershed: 57% forested, subdom = field P1 corridor: 36% urban, subdom = forest	*Increased load* P2 deposition range: >5/mi Sum steep riffles and mid-bars = 2	*Increased stream power: slope* Encroachment: >50% Scour below bridge *Decreased stream power: slope* P2 deposition range: >5/mi	*In Ba ba

Jail Branch *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
T3.01A	*Increased flows* Deforestation Urbanization Industrial development	*Increased load* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 1	*Increased stream power: slope* Straightening: >75-100% Encroachment: >75-100% 1 stormwater input	*D Dr *In La

Jail Branch *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
	Roads and ditching P1 watershed: 71% forest, sub dom = crop P1 corridor: 81% urban, sub dom = crop		Industrial runoff *Increased stream power: depth* Dredging likely according to road engineer reports *Decreased stream power: slope* P2 deposition range:>5/mi Deposition above and below two bridges	be *D Er Do ba *In Ar
T3.01B	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching P1 watershed: 71% forest, sub dom = crop P1 corridor: 81% urban, sub dom = crop	*Increased load* P2 deposition range: >5/mi P2 sum steep riffles & mid-bars = 6 Gully input	*Increased stream power: slope* Straightening: >75-100% Encroachment: >75-100% 9 stormwater inputs Industrial runoff *Increased stream power: depth* *Decreased stream power: slope* P2 deposition range:>5/mi P2 sum steep riffles and mid-bars >5 Deposition above and below bridges	*D Dr *In La be *D Er Do ba *In Ar RE
T3.02A	*Increased flows* Deforestation Urbanization Roads and ditching P1 watershed: 71% forest, sub dom = crop P1 corridor: 30% forest, sub dom = urban	*Increased load* Mass failures >5/mile Tributary inputs	*Increased stream power: slope* Encroachment: >75-100% both banks Parking lot runoff Scour above and below bedrock constriction and above old abuttment *Decreased stream power: slope* P2 deposition range:>5/mi Deposition above old abuttment	*In 3 s (in wa *In Be *D Ur ma
T3.02B	*Increased flows* Deforestation Urbanization Roads/ditching P1 watershed: 71% forest, sub dom = crop P1 corridor: 30% forest, sub dom = urban	*Increased load* P2 deposition range: >5/mi Sum steep riffles and mid-bars = 17	*Increased stream power: slope* Encroachment: >75-100% RB, >20% LB Straightening almost 50% 11 stormwater inputs *Decreased stream power: slope* P2 deposition range:>5/mi Sum steep riffles and mid-bars >5	*In gra *D Er Bu
	Increased flows Deforestation Urbanization	*Increased load* P2 deposition range: >5/mi Sum steep riffles and mid-	*Increased stream power: slope* Encroachment: >75-100% one bank Straightening > 20%	*D Bu >3

Jail Branch *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
T3.03A	Industrial development Roads and ditching P1 watershed: 75% forest, sub dom = crop P1 corridor: 33% urban, sub dom = crop	bars = 7 Major in-segment and upstream mass failures Gully in segment Trib rejuvenation	5 stormwater inputs *Decreased stream power: slope* P2 deposition range:>5/mi Sum steep riffles and mid-bars >5 Deposition above and below bridge	*In Ar
T3.03B	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching P1 watershed: 75% forest, sub dom = crop P1 corridor: 33% urban, sub dom = crop	*Increased load* P2 deposition range: >5/mi Major in-segment and upstream mass failures Trib rejuvenation	*Increased stream power: slope* Encroachment: >30% one bank Straightening > 50% *Decreased stream power: slope* P2 deposition range:>5/mi	*D Bu sub *In Ar
T3.04A	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching *Decreased flows* Upstream flood control dam P1 watershed: 76% forest, subdom = crop P1 corridor: 35% urban, sub dom = forest	*Increased load* P2 deposition range: >5/mi Sum of steep riffles and mid-bars = 4 Major in-segment and upstream mass failures Trib rejuvenation	*Increased stream power: slope* Encroachment: >30% one bank *Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars = 4	*In Bo *In Bo
T3.04B	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching *Decreased flows* Upstream flood control dam P1 watershed: 76% forest, sub dom = crop P1 corridor: 35% urban, sub dom = forest	*Increased load* P2 deposition range: >5/mi Major in-segment and upstream mass failures	*Increased stream power: slope* Encroachment: 75-100% one bank Straightening: >50% Artificial narrowing of stream channel Stormwater inputs = 1 Scour above and below rock constriction *Decreased stream power: slope* P2 deposition range:>5/mi Deposition above and below bridge	*In Bo *D Bu sub *In Bo Ar RE
	Increased flows Deforestation	*Increased load* P2 deposition range: >5/mi	*Increased stream power: slope* Encroachment: >50% both banks	*In Bo

Jail Branch *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
T3.04C	Roads and ditching *Decreased flows* Upstream flood control dam P1 watershed: 76% forest, sub dom = crop P1 corridor: 35% urban, sub dom = forest	*Decreased load* Historic dam in upstream segment still traps some sediment	Straightening: 100% Stormwater inputs = 2 Tributary rejuvenation *Decreased stream power: slope* P2 deposition range:>5/mi	*D Bu sub *In Bo Ar
T3.04D	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching *Decreased flows* Upstream flood control dam P1 watershed: 76% forest, sub dom = crop P1 corridor: 35% urban, sub dom = forest	*Increased load* P2 deposition range: >5/mi *Decreased load* Historic dam in segment still traps some sediment. Dam in upstream reach probably traps sediment	*Increased stream power: slope* Road encroachment: >30% both banks Development >50% one bank Straightening: 75-100% Stormwater inputs = 5 Artificial narrowing of valley *Decreased stream power: slope* P2 deposition range:>5/mi	*In Bo *D Bu *In Bo Ar ba
T3.05A	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching *Decreased flows* Upstream in-reach flood control dam P1 watershed: 76% forest, sub dom = crop P1 corridor: 38% crop, sub dom = urban	*Increased load* P2 deposition range: >5/mi Sum of steep riffles and mid-bars = 5 *Decreased load* Dam upstream probably traps sediment	*Increased stream power: slope* Encroachment: 100% one bank 40% both banks Straightening: 75-100% Stormwater inputs = 5 Artificial narrowing of valley *Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars = 5	*In Bo *D Bu ba *In Bo Ar RE
T3.05B	*Increased flows* Deforestation Urbanization Industrial development Roads and ditching *Decreased flows* Flood control dam at	*Decreased load* Dam at top of segment probably traps sediment	*Increased stream power: slope* Development: >60% both banks Straightening: 100% Possible artificial narrowing of valley	*In Bo nat *D Bu LE

Jail Branch *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
	top of segment P1 watershed: 76% forest, sub dom = crop P1 corridor: 38% crop, sub dom = urban			*In Bo Ar RE

Honey Brook *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
T3.02S4.01A	*Increased flows* Deforestation Urbanization Roads and ditching P1 watershed: 60% forest, sub dom = crop P1 corridor: 42% forest, sub dom = urban	*Increased load* P2 deposition range: >5/mi Mass Failures-Gullies >5/ mile Sum of steep riffles and mid-bars = 3 *Decreased load* Dam upstream probably traps sediment	*Increased stream power: slope* Encroachment: >20% one bank Straightening: >50% Stormwater inputs = 3 Dredging after 2008 flooding *Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars =3 Deposition above and below bridge	*D Dr *D Bu ba Ma
T3.02S4.01B	*Increased flows* Deforestation Urbanization Roads and ditching P1 watershed: 60% forest, sub dom = crop P1 corridor: 42% forest, sub dom = urban	*Increased load* P2 deposition range: >5/mi Mass Failures-Gullies 2-5/ mile Sum of steep riffles and mid-bars = 3	*Increased stream power: slope* Stormwater inputs = 1 Scour below bedrock constriction *Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars =3 Deposition above and below old abutment and culvert	*In 3 r *In So *D Ma
T3.02S4.02A	*Increased flows* Deforestation Urbanization Ongoing agriculture Roads and ditching P1 watershed: 48% forest, sub dom = crop P1 corridor: 36% forest, sub dom = wetland	*Increased load* P2 deposition range: >5/mi Sum of steep riffles and mid-bars = 2	*Increased stream power: slope* Stormwater inputs = 2 Development and encroachment > 50% both sides Straightening 20% *Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars =2 Deposition below culvert	*D Bu

Honey Brook *Stressors Identification Table*	**Watershed Input Stressors**		**Reach Modification Str**	
T3.02S4.02B	*Increased flows* Deforestation Urbanization Ongoing agriculture Roads and ditching P1 watershed: 48% forest, sub dom = crop P1 corridor: 36% forest, sub dom = wetland	*Increased load* P2 deposition range: >5/mi Sum of steep riffles and mid-bars = 6	*Increased stream power: slope* Scour below two culverts Some evidence historic dredging/channelizing for agriculture and road crossings Decreased stream power: slope* P2 deposition range:>5/mi Sum of steep riffles and mid-bars >5 Deposition below old abuttment	*D Hi agr

5.1.3a Channel slope modifiers

Results for the Stevens Branch indicate that primary stressors include extensive bank erosion alternating with frequent straightening and armoring of the channel. Road encroachment and development is significant, particularly on the east side of the river (Fig 15). Stressors for the Jail Branch also include extensive encroachment and development (Fig 16), and the stream is particularly impacted by extraordinarily large mass failures on the north side of the valley. Honey Brook stressors also include bank erosion and mass failures, to a lesser degree (Fig 16). Severe flashflooding along this brook in 2008 highlighted and exacerbated these stressors. Phase 2 analysis shows that 6 of 14 segments along Stevens Branch, and 9 of 12 segments on the Jail have more than 50% straightening. In areas with erodible boundary materials channel straightening can lead initially to slope increases through bed erosion (exacerbated if there is a loss in floodplain access due to increased downcutting), and can play a significant role in enhancing sediment transport capacity as a result of the increased slope and depth at flood stage. This incision process and these same erodible boundary materials then readily allow for stream widening through bank erosion, in turn reducing slope through deposition. These forces are clearly at play in the Stevens Branch where substrates are dominated by sands. In this type of sediment regime, the enhanced transport capacity due to slope increases from straightening further contributes to stress in reaches downstream: instead of storing some of the increased load, the straightened reaches are now conveying sediment until a constriction or significant decrease in slope is encountered (these slope decreases often build on themselves as further deposits accrue in these same areas during high flow events). Roads and developments within the river corridor further contribute to an increased channel slope when structural measures are used to protect those encroachments.

During 2008 Phase 2 assessment in the Stevens Branch watershed historic tributary rejuvenation was noted in many reaches, indicating that the larger streams have significantly incised. Tributary rejuvenation generally suggests increased sediment contributions from tributaries as downcutting proceeds upstream in the process of tributaries lowering their elevations to meet the lowered elevation of the mainstem. For most reaches, this process appears to have already occurred and to have stabilized. Incision on the Stevens Branch appears, on all but 4 segments, to be giving way to widening and aggradation. The aggradational process causes slope decreases, which then leads to additional aggradation as streampower decreases in these areas and further sediments drop out. On the Jail Branch and Honey Brook, tributary rejuvenation appears to be more current, and the majority of reaches are in a degradational phase of evolution.

Only two active head cuts or were noted in Phase 2 assessment, however, neither of which seemed to indicate reach-wide incision processes. Both were located on the Stevens Branch in areas that are aggrading more than degrading (segments M1.10B and M1.12B), and the head cuts are unlikely to continue upstream. In both cases, coarser rock appeared to have been added to the stream, leading to a build-up of coarser material across the channel, and subsequently creating a scour feature just downstream.

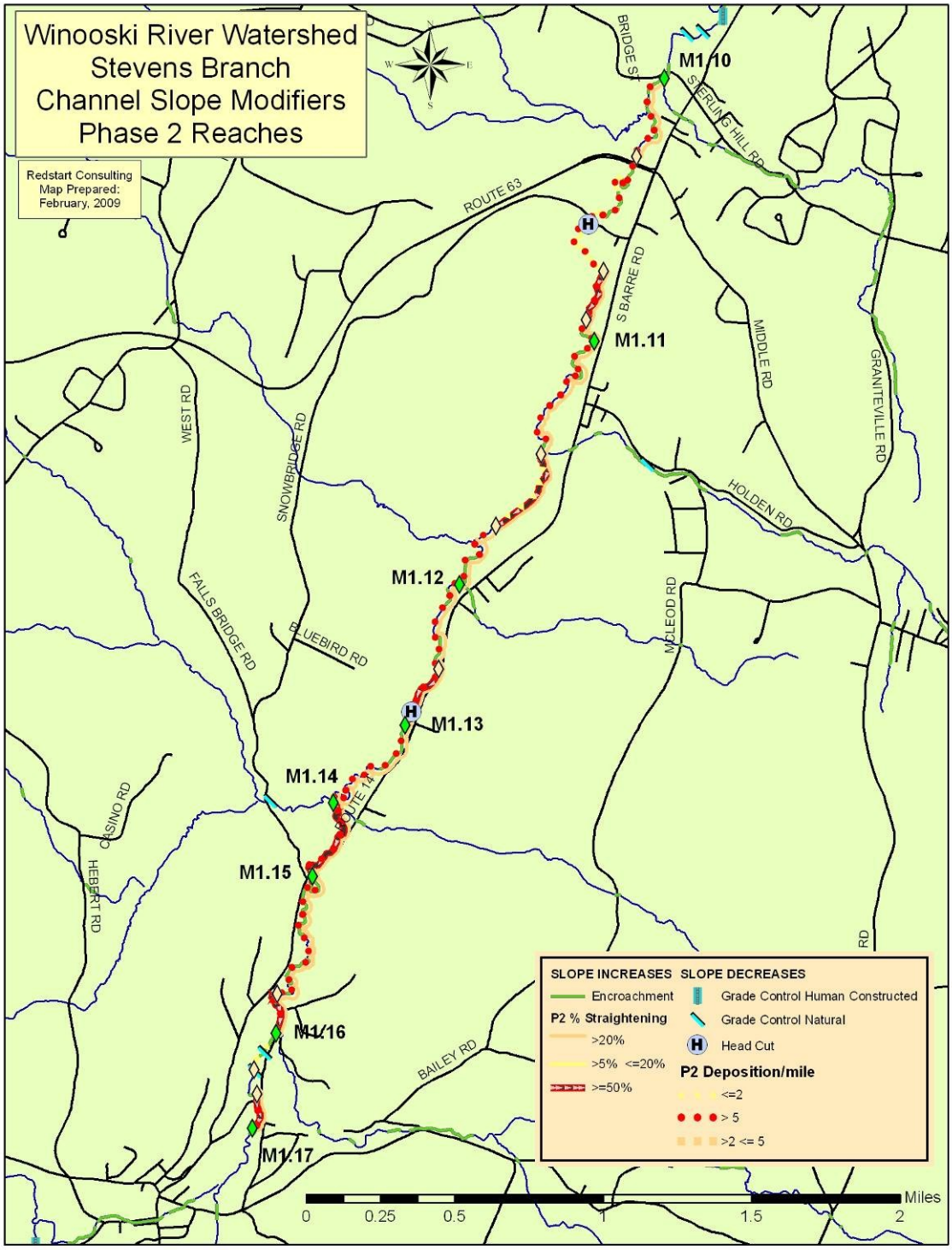

Figure 15: Reach-scale stressors: Channel Slope Modifiers for Phase 2 reaches on the Stevens Branch.

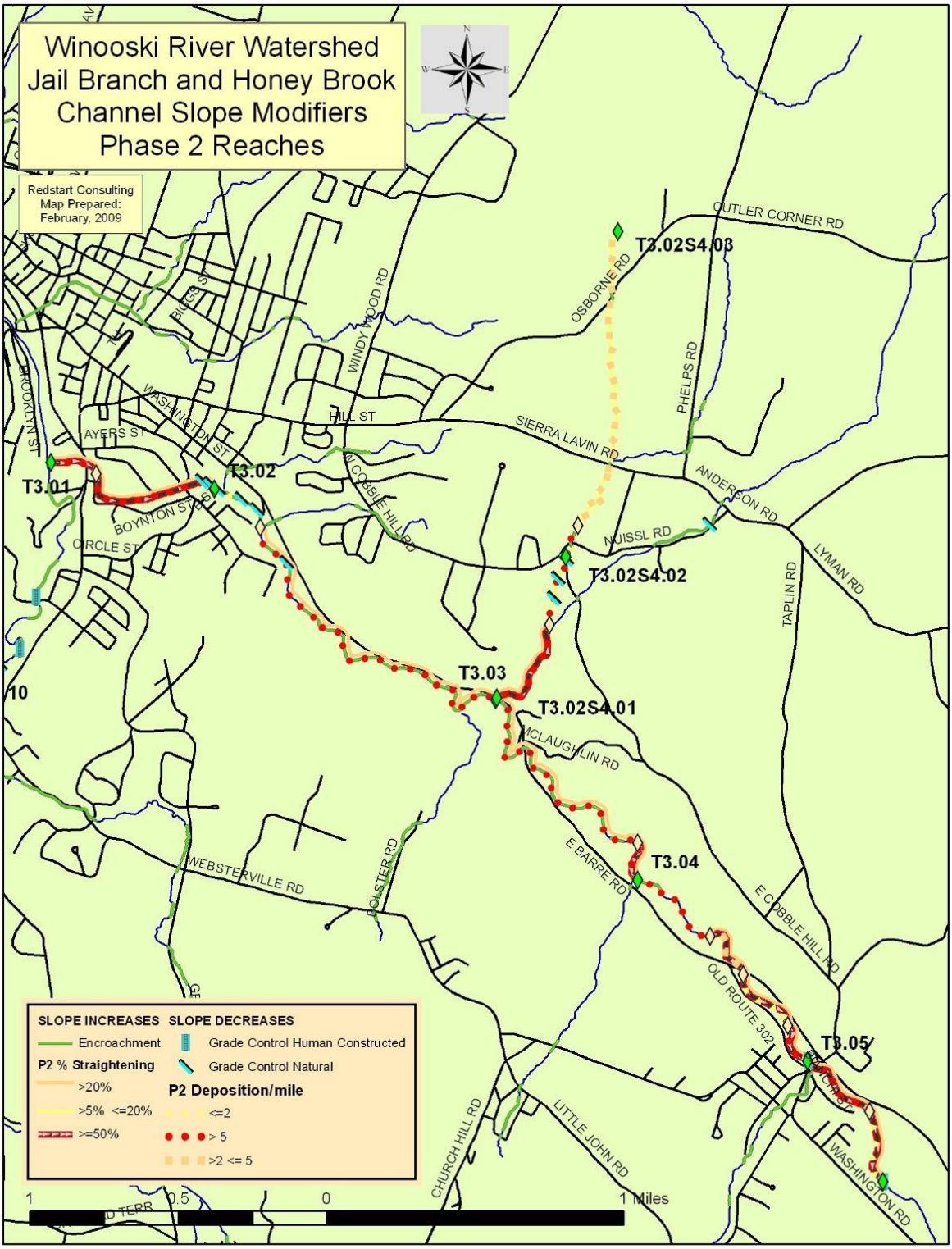

Figure 16: Reach-scale stressors: Channel Slope Modifiers for Phase 2 reaches on the Jail Branch and Honey Brook

5.1.3b Channel depth modifiers

Phase 1 and 2 data collection on the Stevens and Jail Branches and Honey Brook indicate extensive road and development encroachment in at least some portion of all reaches assessed in Phase 2 (26 of 31 segments showed >20% corridor encroachments, and 18 showed >50% encroachment). This has served to reduce the effective width of the valley and floodplain in all but a few of the segments of the project area. Elevated roads and development within the river corridor increase the depth of flood flows, and thus also increase stream power.

Significant deposition creates potential for shallower depths during low and moderate flows. Stream power is then reduced in these areas, leading to further deposition. Moderate to heavy deposition was noted in 5 segments of the Stevens (Fig. 17), but only one on the Jail Branch; Honey Brook did not show significant deposition (Fig 18).

Storm water inputs were documented in Phase 2 fieldwork throughout the study area, but were particularly concentrated in the Barre City portion of the study area that contains the downstream portion of the Jail Branch. The segments in the vicinity of East Barre also had considerable storm water inputs. Storm water inputs in these two places were generally in the form of urban runoff. On the Stevens Branch, storm water inputs were more frequently the result of agricultural field ditching, and occasionally from road ditching. Cumulatively, direct storm water inputs to the stream can significantly increase peak discharge during high water events, which typically results in an increase in flow depths and stream power.

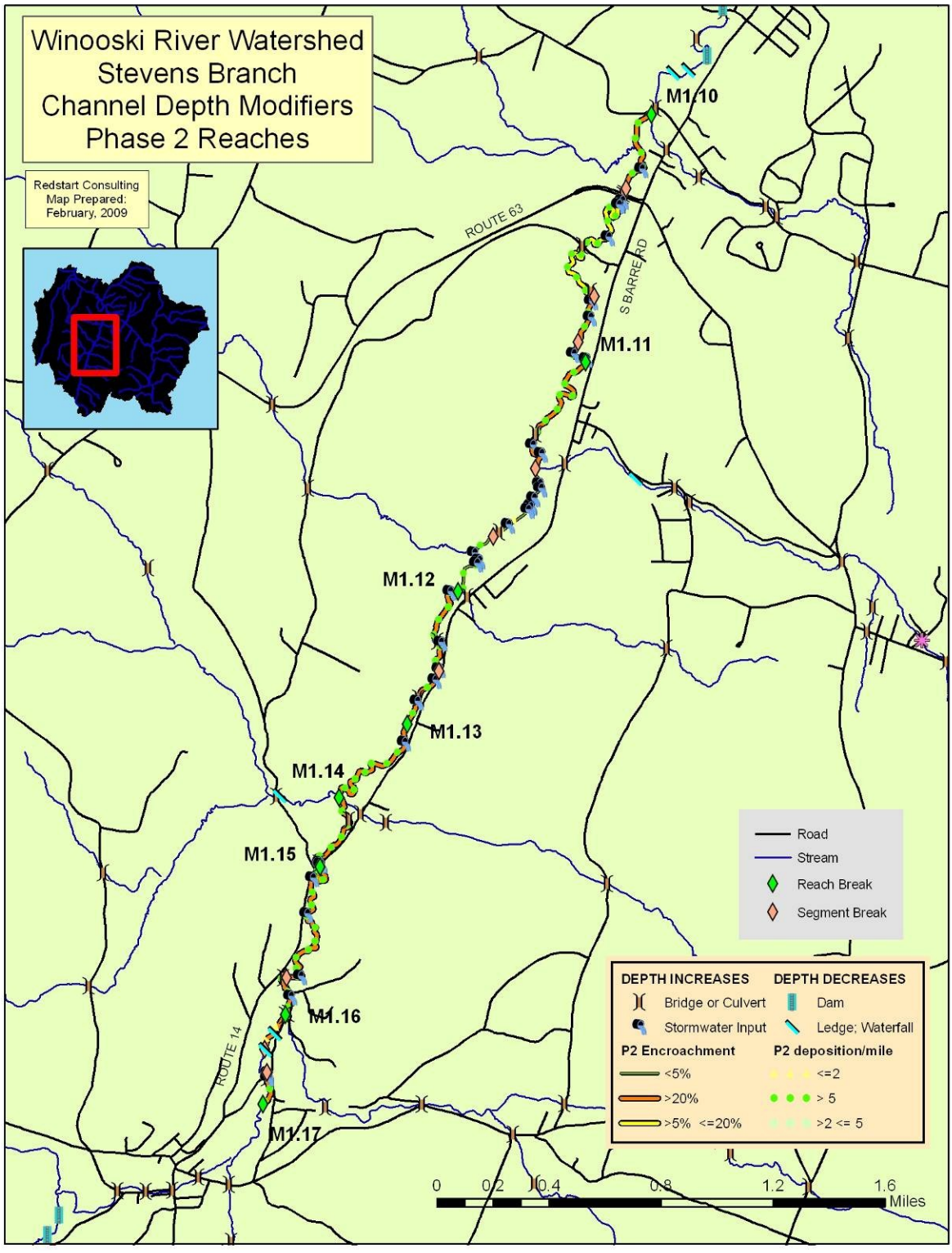

Figure 17: Reach-scale stressors: Channel Depth Modifiers for the Phase 2 reaches on the Stevens Branch

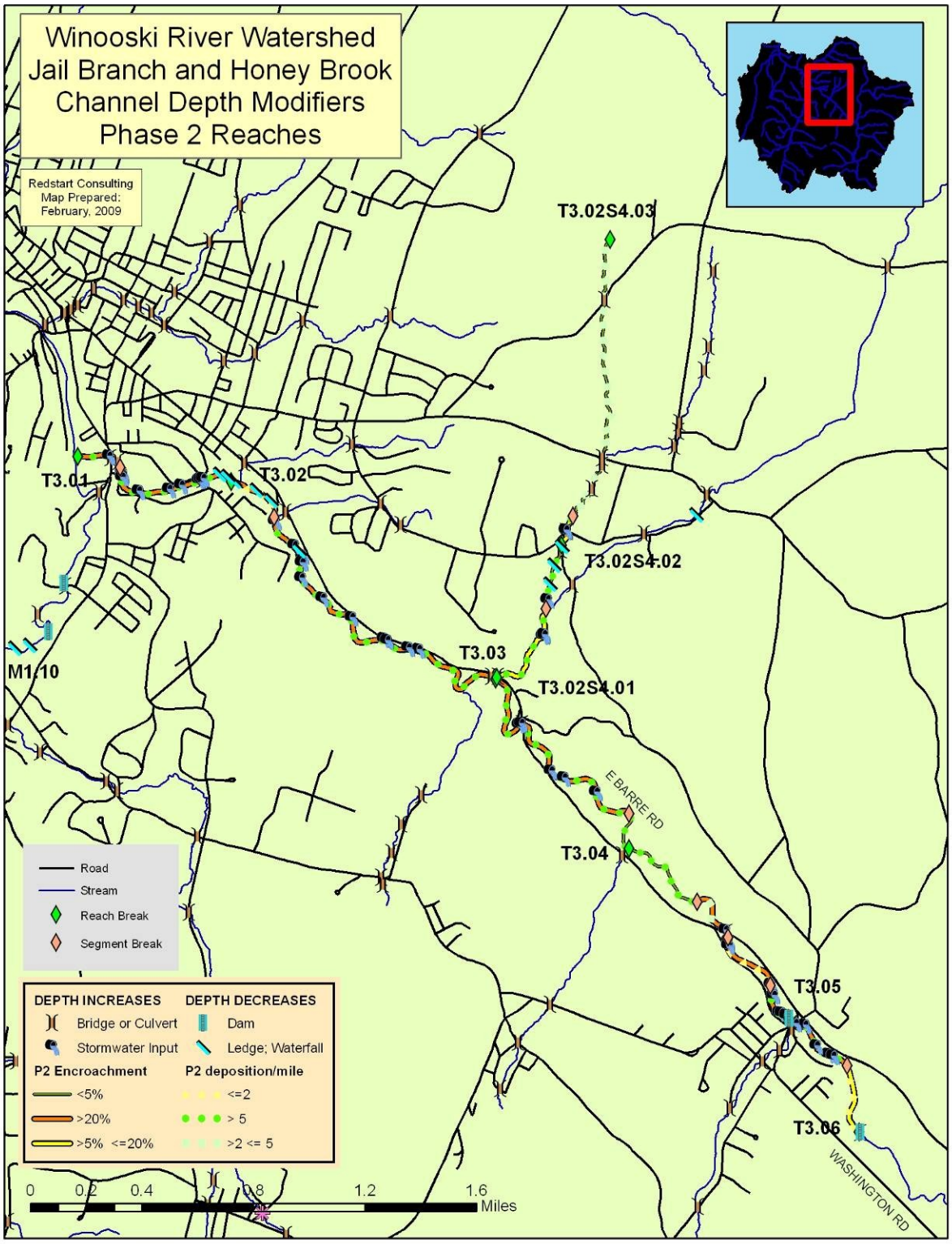

Figure 18: Reach-scale stressors: Channel Depth modifiers for the Phase 2 reaches on the Jail Branch and Honey Brook.

5.1.3c Boundary condition and riparian modifiers

Stream boundaries include bed and banks, and are also affected by the state of buffer vegetation in the riparian corridor. Root systems from woody vegetation (and, to a lesser extent, herbaceous vegetation) help bind stream bank soils.

Bed materials were coarse in all reaches assessed along the Jail Branch and on the upper half of the Stevens assessed reaches (M1.11C through M1.16, but not including M1.14). Bed materials were coarse for the lower half of Honey Brook (first reach and first segment of second reach). Upper bank materials are often more easily erodible in flood flows than the bed and lower banks. Sand, gravel, and mixed substrates were the predominant upper bank materials for all of the assessed Stevens Branch reaches (except for M1.16A), for the lowest reach of the Jail Branch and the first segment on T3.03, and for both reaches on Honey Brook. Bank erosion was noted extensively throughout the watershed, particularly in areas where riparian buffers lacked significant vegetation and banks were not armored. Mass failures were also common. On the Jail Branch, the mass failures are related to a soil layering that has sands deposited over a clay layer, creating significant instabilities. Often water was found seeping out at the base of this sand layer. Segments indicating erosion on >20% of one or more banks include: M1.10B, M1.11A, M1.12A, M1.13, M1.15A, and T3.01A. Segments with mass failures include: M1.10B, M13-0, T3.01B, T3.02A, T3.02B, T3.03A, T3.03B, T3.04A, T3.04B, T3S4.01A, T3S4.01B. It is clear that the presence of wooded buffers greatly aids the stability of the banks in the study area. Minor to locally extensive areas of hard bank and riprap revetments have been placed throughout the watershed to limit erosion in areas of development and agricultural use where these buffers are lacking (Figs. 19 & 20), exacerbating some of the channel slope and depth modifications discussed in sections 5.1.3a and 5.1.3b above. There was no physical evidence of dredging or gravel mining in the project area. Barre City Road Engineer Reginald Abare feels that sediment build up poses serious problems in the downtown area, commenting that as sediments buildup, flood levels rise (pers. comm. 2008). He suggests also that there are stormwater outfalls that get periodically clogged by stream sediments. Several bridge structures within the city bounds likely contribute to the difficulty the stream is having moving sediments through this area. The costs and benefits associated with replacing and re-sizing existing structures should be explored, as well as the potential for attenuation benefits in T3.01B if the right bank berm were completely or partially removed.

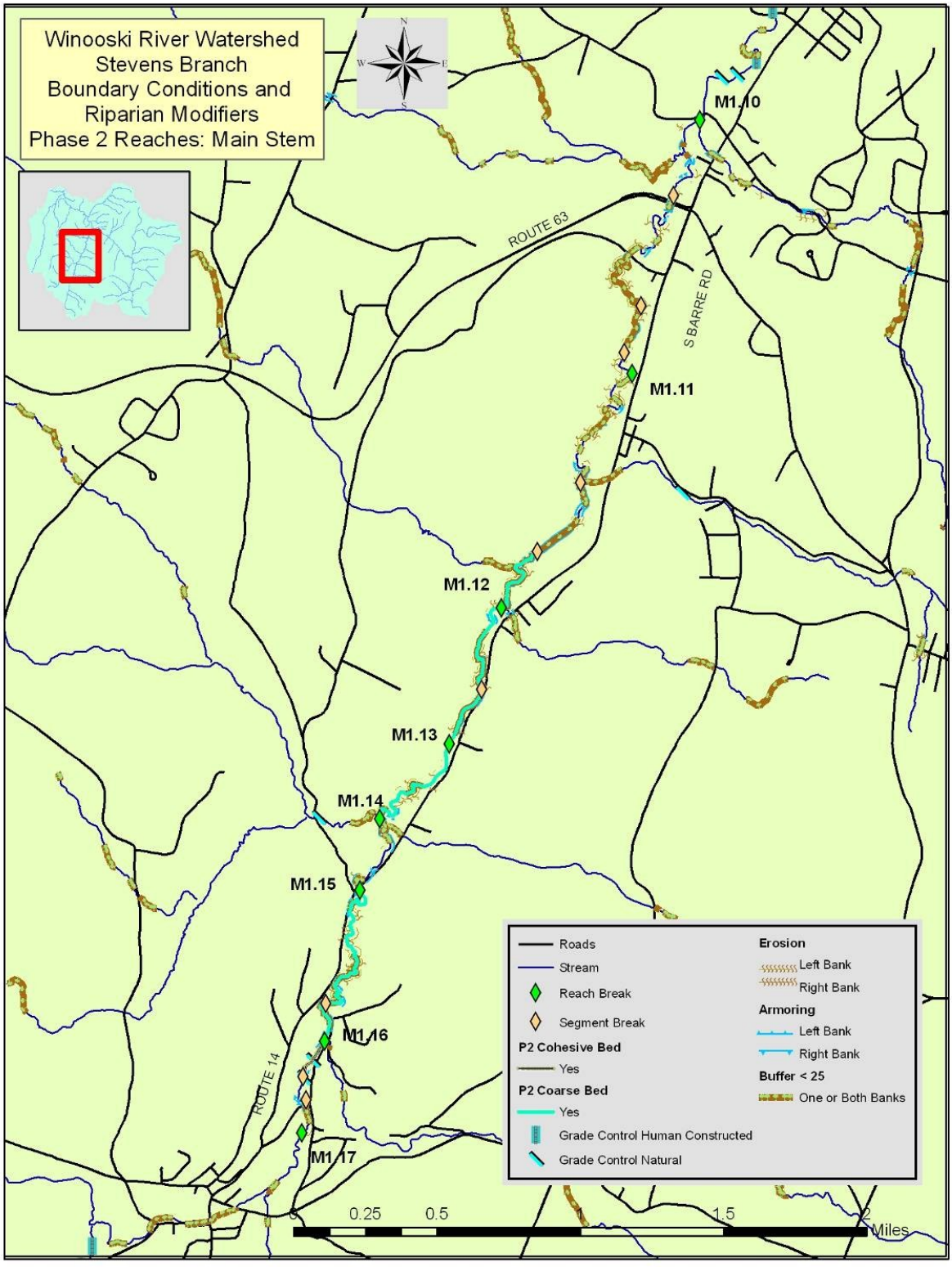

Figure 19. Reach-scale stressors: Boundary condition and riparian modifiers map for the Phase 2 reaches on the Stevens Branch.

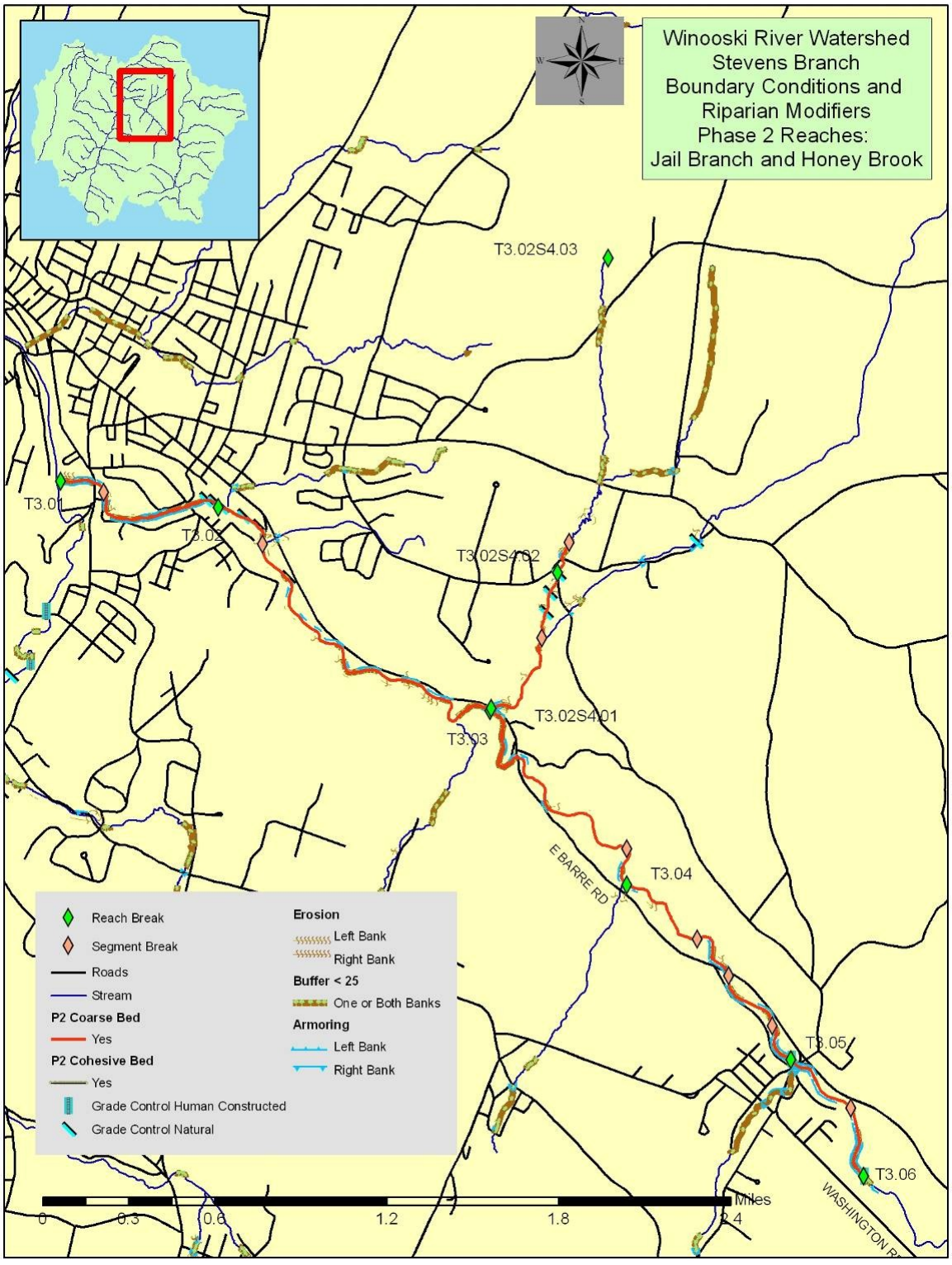

Figure 20: Reach-scale stressors: Boundary condition and riparian modifiers map for the Phase 2 reaches on the Jail Branch and Honey Brook.

5.1.4 Sediment regime departure, constraints to sediment transport, and attenuation

Within a reach, the principals of stream equilibrium dictate that stream power and sediment will tend to distribute evenly over time (Leopold 1994). Changes or modifications to watershed inputs and hydraulic geometry create disequilibrium in the balance of these forces and lead to an uneven distribution of power and sediment (Fig. 21). Whether a project works with or against the physical processes at play in a watershed is primarily determined by examining the source, volumes, and attenuation of flood flows and sediment loads from one reach to the next within the stream network. If increasing loads are transported through the network to a sensitive reach, where conflicts with human investments are creating a management expectation, little success can be expected unless the restoration design accommodates the increased load or finds a way to attenuate the loads upstream (VT ANR 2007).

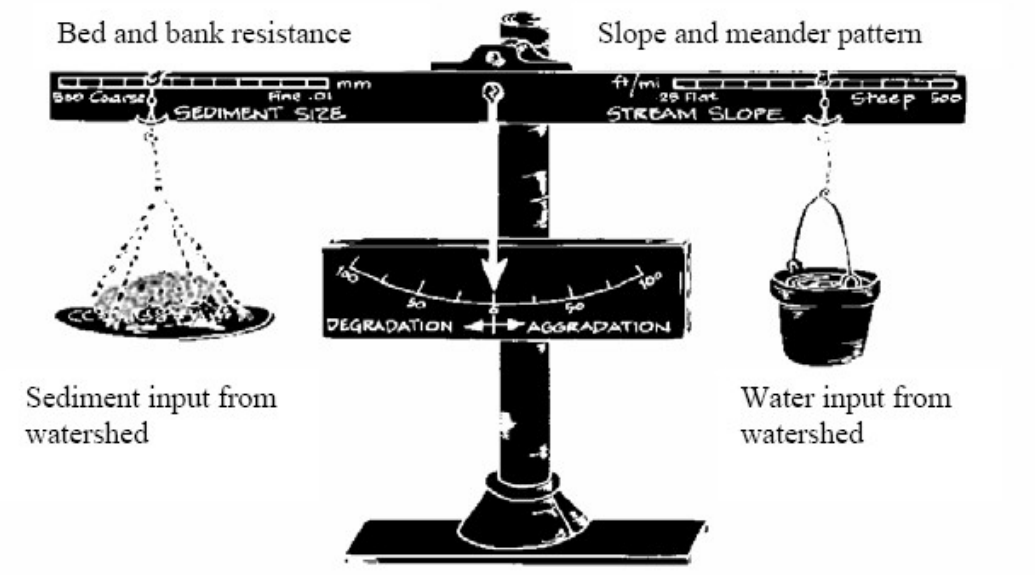

Figure 21. The channel balance indicates how changes in watershed inputs influence channel adjustment processes (Lane 1955).

Phase 1 designates a "reference type" for all reaches. On the Stevens Branch main stem all reaches except M1.16 were typed as E streams, with sand substrate and dune ripple or riffle pool bedform. The Jail Branch showed greater variety, alternating between B and C-types with gravel, cobble or boulder beds, and riffle or step-pool bedforms. Honey Brook has one reach typed as A-type step-pool and one as C-type, gravel bed, riffle-pool. These classifications were based primarily on natural valley confinement and valley slope (see Section 3.3).

STEVENS BRANCH: The E channel type is typically found in unconfined valleys, displays a highly sinuous, meandering nature, and uses floodplains for sediment storage and dissipation of stream power. Under reference conditions, the sediment regime for this stream type would provide for coarse particle equilibrium (in = out: stream power, which

is produced as a result of channel gradient and hydraulic radius, is balanced by the sediment load, sediment size, and channel boundary resistance) and fine sediment deposition at annual flood flows (Coarse Equilibrium and Fine Deposition regime, Table 5; VT ANR 2007, pp. 34–36). Reach M1.16, with its narrowly confined valley, close to a 4% slope, and cobble bed, would be expected, under reference conditions, to transport sediments downstream (Transport regime, Table 5; VT ANR 2007).

JAIL BRANCH: T3.04 and T3.05, given a B-type reference condition would be expected to be Transport reaches. T3.02 is a B-type stream with a C slope. The overall channel slope is 2% and the valley is primarily semi-confined, but Spaulding Falls at the base of the reach accounts for close to 100 ft of elevation gain, and most of the reach has a much lower slope. There has also been some encroachment that has narrowed the valley, making it tricky to determine whether the valley might have been narrow, at least in place, when in reference condition. This reach should be considered as having a Coarse Equilibrium and Fine Deposition sediment regime. T3.01 and T3.03, with C-type reference designation would have Coarse Equilibrium and Fine Deposition.

HONEY BROOK: T3.02S4.01, an A-type stream by reference, would be expected to be a transport reach. T3.02S4.02, a C-type stream by reference, would be a Coarse Equilibrium and Fine Deposition reach despite a >2% slope overall in the reach; a large proportion of the gradient is accounted in a relatively short portion of the reach on the downstream end.

Table 8. Reference sediment regime parameters for Stevens Branch basin 2008 study area reaches

Sediment regime	Natural valley types	Pertinent reference stream types	Applicable Stevens Branch basin reaches
Transport	NC, SC, NW Valley slope >2%	A, B	M1.16, T3.04, T3.05, T3.02S4.01
Coarse equilibrium (in = out) & fine deposition	NW, BD, VB Valley slope <2%	C, E	M1.10-M1.15, M1.17, T3.02, T3.02S4.02

NC, Narrowly confined; SC, Semiconfined; NW, Narrow; BD, Broad; VB, Very Broad

Table 9. Pertinent data for characterizing existing sediment regime using Phase 2 data (VT ANR RCPG 2007)

<table>
<tr><td rowspan="4">Transport
Coarse equilibrium & fine deposition</td><td rowspan="4">Incision <1.3</td><td colspan="3">Valley type = NC, SC, or bedrock gorge</td><td rowspan="2"></td></tr>
<tr><td>Valley type = NW</td><td colspan="2">A, B, G, or F</td></tr>
<tr><td></td><td colspan="2">Bc, C, E, or D</td><td rowspan="2"></td></tr>
<tr><td colspan="3">Valley type = BD or VB</td></tr>
<tr><td>Confined storage & transport</td><td rowspan="4">Incision ≥1.3</td><td colspan="4">Valley type = NC or SC</td><td></td></tr>
<tr><td>Unconfined storage & transport</td><td rowspan="3">Valley type = NW, BD, VB</td><td>Channel evolution stage = I/II/III/V</td><td>Bank armoring and straightening ≥50%</td><td></td></tr>
<tr><td>Fine storage & transport, coarse deposition</td><td>Bank armoring or straightening <50%</td><td></td></tr>
<tr><td colspan="2">Channel evolution stage = IV</td><td></td></tr>
</table>

Sediment regime departure is determined based on a number of parameters measured in Phase 2 assessments (VT ANR 2007b, pp. 34–36), as summarized in Table 5. These include field signs of active adjustment processes indicating that streams are in a state of disequilibrium, including a likely stage of channel evolution.

Once a stream has entered a state of disequilibrium, it will begin a series of channel adjustments or evolutions to fulfill the physical mandates of restoring equilibrium. Schumm (1977 and 1984) has described five stages of channel evolution (Fig. 22) for reaches such as those found in the Project area, where the stream has a bed and banks that are sufficiently erodible to be shaped by the stream over time, paraphrased from the SGA protocols (VT ANR 2006, Appendix C) as follows:

I. Stable — in regime, reference to good condition. Insignificant to minimal adjustment; planform is moderate to highly sinuous.

II. Incision — Fair to poor condition, major to extreme channel degradation. High flow events are contained in the channel, and channel slope is typically increased.

III. Widening/Migration — Fair to poor condition, major to extreme widening and aggradation.

IV. Stabilizing — Fair to good condition, major reducing to minor aggradation, widening and planform adjustments

V. Stable — In regime, reference to good condition. Insignificant to minimal adjustment.

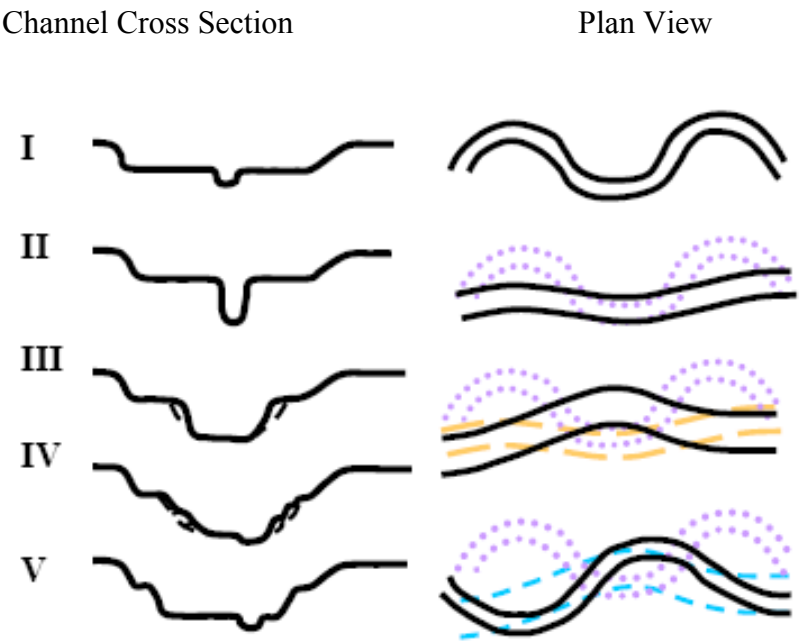

Figure 22. Channel evolution process showing channel downcutting or incision in Stage II (cross section), widening through Stages III and IV, and floodplain reestablishment in Stage V. Stages I and V represent equilibrium conditions. Plan view shows straightening and meander redevelopment that accompany cross-section changes, a flood-driven process taking place over decades (VT ANR 2007b).

Phase 2 measurements found historical incision (downcutting) throughout much of the Stevens Branch basin 2008 assessment area, indicating reduced access of the river to historical floodplains in most reaches in conjunction with significant straightening and channelization that have served to increase stream power.

None of the Stevens Branch mainstem segments were characterized by cobble substrates. Sands dominate the lower reaches, with gravel becoming more dominant in upstream reaches. Only M1.16 had a coarser substrate of boulders and bedrock, transitioning back to sand in its uppermost segment. The Jail Branch transitions from gravel in its lowest reach to cobble in the next two reaches, and finally to boulders in the uppermost reaches. Honey Brook transitions from cobble in the downstream segment, through gravel, and finally to sand in its uppermost segment.

Planebed systems (if not reference condition) are often indicative of initial erosion of bed features and subsequent deposition of relatively finer-grained (small cobble, gravel, and sand) particles which serves to reduce channel bed roughness and thus further increase stream power and transport capacity. There are two segments on the Stevens Branch mainstem (M1.10C and M1.11B) and two segments on the Jail Branch (T3.01A and T3.05B) described as planebed. These reaches have been extensively straightened and armored.

Sediment regime departures from reference condition were common in the project area, with a total of 17 of 28 segments being reclassified during based on Phase 2 assessment (Table 10; Fig 23;).

Seven of the fourteen reaches on the Stevens Branch display sediment regime departures from their reference condition. All but one of these was classified during the Phase 1 process as Coarse Equilibrium (in=out) & Fine Deposition, and have been classified through the Phase 2 assessment process as Fine Source and Transport & Coarse Deposition. This change is typical of stream reaches in unconfined valleys that are significantly incised and not extensively armored. This type of departure tended to alternate irregularly with segments retaining their reference sediment regime. The seventh segment departed from Coarse Equilibrium to Confined Source & Transport. This is typical of an incised reach in a confined valley. The alternating pattern of reference and altered sediment regime on the Stevens Branch maybe explained by the pattern of incision and widening witnessed there. Incision has occurred throughout, historically, but straightened and armored reaches are serving to transport sediments through more readily to be deposited in less straightened reaches. The segments where deposition is occurring are re-adjusting by widening and aggrading. Aggradation has the affect of reducing incision ratios as the channel fills up again with sediment. An exception to this expected result can be found in M1.11B, which is by far the most straightened and armored segment of its reach, and yet is the only segment not to have been reclassified. The incision ratio for this segment, however, is very close to a value that would trigger a sediment regime departure.

Table 10. Sediment regime characterization criteria for Stevens Branch corridor planning Project area reaches (see Tables 8 & 9 above for color coding and brief description of sediment regimes).

Reach/Segment Existing Sediment Regime Reference sediment regime in parentheses	Incision Ratio	Natural Valley Type (existing type in parentheses)	Straightening and Bank armor (% range)	Channel Evolution Stage Geomorphic Condition	Existing/Reference Stream Type
StevensBranch mainstem					
M1.10A FSTCD (CEFD)	1.5	VB (VB)	20-50 5-20	III Fair	C5/E5
M1.10B CEFD (CEFD)	1.3	VB (VB)	5-20 20-50	III Fair	E5/E5
M1.10C CST (CEFD)	1.8	SC (VB)	100 20-50	II Poor	E5/E5
M1.10D CEFD (CEFD)	1.2	BD (VB)	20-50 <5	III Fair	C5/E5
M1.11A FSTCD (CEFD)	1.6	VB (VB)	20-50 5-20	III Fair	E5/E5
M1.11B CEFD (CEFD)	1.3	VB (VB)	100 >50	II Fair	E5/E5
M1.11C FSTCD (CEFD)	1.7	VB (VB)	20-50 20-50	IV Fair	C4/E5
M1.12A CEFD (CEFD)	1.2	BD (VB)	20-50 5-20	IV Fair	E4/E4
M1.12B FSTCD (CEFD)	1.6	VB (VB)	>50 20-50	III Fair	E4/E4
M1.13 FSTCD (CEFD)	1.4	BD (VB)	20-50 5–20	IV Fair	C4/E4
M1.14 CEFD (CEFD)	1.2	VB (VB)	>50 >50	II Fair	E5/E5
M1.15A CEFD (CEFD)	1.4	VB (VB)	20–50 20-50	III Fair	E4/E4
M1.15B FSTCD (CEFD)	1.5	VB (VB)	100 20-50	III Fair	C4/E4

Reach/Segment Existing Sediment Regime Reference sediment regime in parentheses	Incision Ratio	Natural Valley Type (existing type in parentheses)	Straightening and Bank armor (% range)	Channel Evolution Stage Geomorphic Condition	Existing/Reference Stream Type
M1.16A T (T)	1.0	NC (NC)	5-20 20-50	I Reference	B2/B3
M1.16C T (T)	1.3	NC (NC)	>50 20-50	II Fair	Bc5/B3
Jail Branch					
T3.01A UST (CEFD)	3.22	VB (VB)	100 >50	II Fair	F4/C4
T3.01B UST (CEFD)	2.0	VB (VB)	>50 >50	II Fair	C4/C4
T3.02A T (CEFD)	1.0	NC (SC)	0 0	IIC Fair	F3/B3
T3.02B CST (CEFD)	3.33	SC (SC)	20-50 20-50	IV Fair	Bc3/B3
T3.03A FSTCD (UNKNOWN)	1.7	BD (BD)	20-50 20-50	IV Fair	C3/C3
T3.03B T (T)	1.23	NC (BD)	>50 20-50	II Fair	Cb3/C3
T3.04A T (T)	1.2	NC (SC)	0 <5	IIc Fair	B2/B2
T3.04B T (T)	7.3	NC (SC)	>50 >50	IIc Fair	F2/B2
T3.04C UST (T)	1.4	BD (SC)	100 >50	II Good	Cb2/B2
T3.04D T (T)	2.6	NC (SC)	>50 >50	II Fair	F2/B2
T3.05A CST (T)	1.9	NC (NC)	>50 >50	II Fair	Ba2/Ba2
T3.05B T (T)	1.0	SC (NC)	100 >50	I Fair	B3/Ba2

Reach/Segment **Existing Sediment Regime** **Reference sediment regime in parentheses**	**Incision Ratio**	**Natural Valley Type** **(existing type in parentheses)**	**Straightening and Bank armor (% range)**	**Channel Evolution Stage** **Geomorphic Condition**	**Existing/Reference Stream Type**
Honey Brook					
T3.02S4.01A T (T)	1.0	SC (NC)	>50 5-20	III Fair	B3/A
T3.02S4.01B T (T)	1.0	NC (NC)	5-20 <5	IIc Fair	F4/A
T3.02S4.02A CST (CEFD)	3.8	NC (N)	5-20 5-20	IV Fair	B4/Cb4
T3.02S4.02B FSTCD (CEFD)	1.8	VB (N)	5-20 0	IV Fair	C5/Cb4

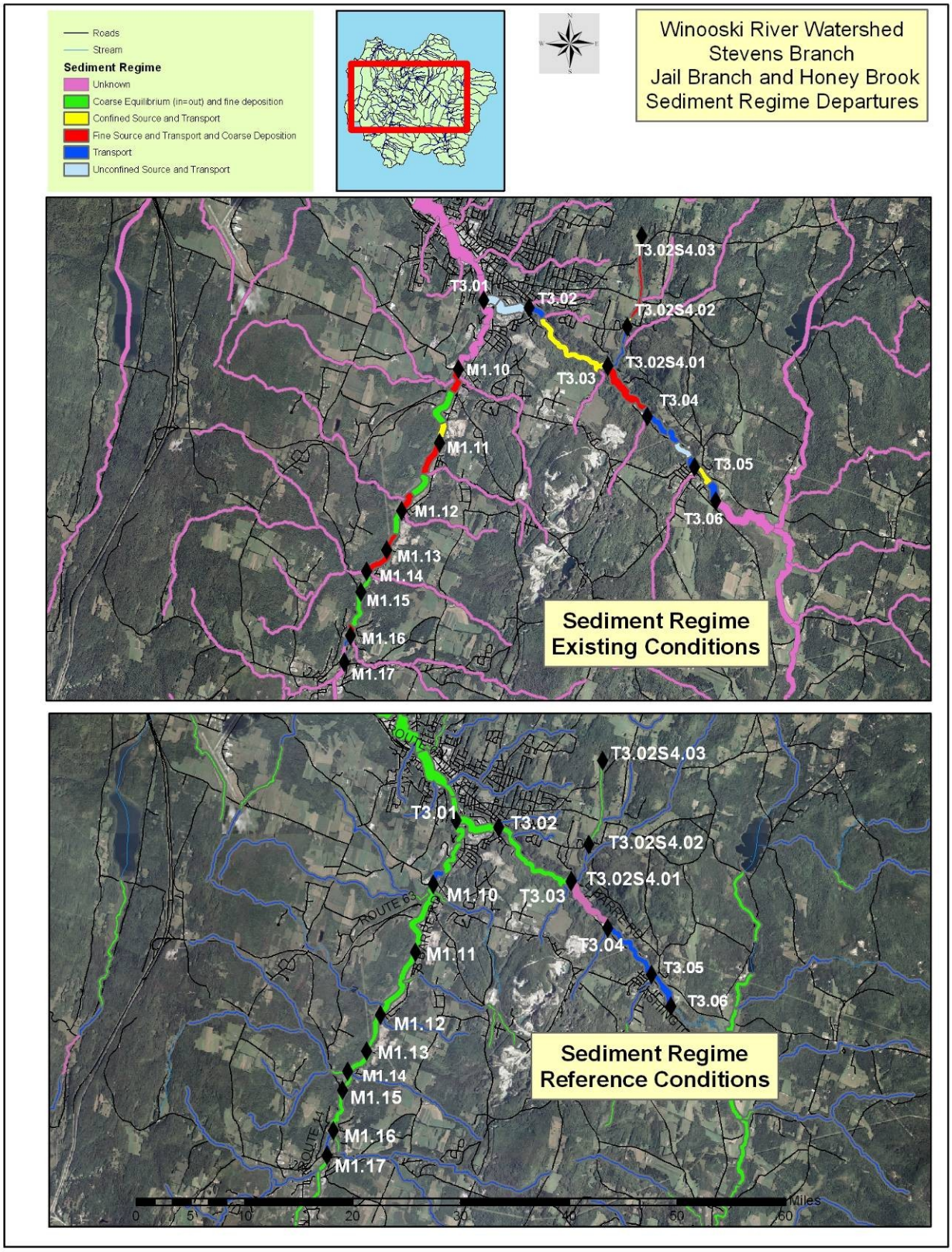

Figure 23: Sediment Regime Departure: Sediment regimes for the Phase 2 project area; reference conditions vs. existing conditions.

On the Jail Branch, departures were more varied. T3.01 (both segments) changed from Coarse Equilibrium to Unconfined Source and Transport. This is typical of reaches in unconfined valleys that are significantly incised and extensively armored (an exact description of these two segments). Segment T3.02A changed from Coarse Equilibrium to Transport, a change that reflects the coarseness of the Phase 1 assessment, rather than a real change in sediment regime (ideally, this portion of the reach would have been separated out during the Phase 1 process). Segment T3.02B has been changed from Coarse Equilibrium to Confined Source and Transport, a change typical for reaches in confined valleys with significant incision. Reach T3.03 was classified as Unknown during the Phase 1 process. The Phase 2 process classifies both segments as Fine Source & Transport & Coarse Deposition; typical of reaches in unconfined valleys with significant incision and without extensive armoring. Segment T3.04C was the only segment of its reach to be reclassified from Transport to Unconfined Source & Transport (similar to T3.01). T3.05B was reclassified from Transport to Confined Source & Transport; typical because this segment is in a confined valley and is significantly incised. Sediment regime changes on the Jail Branch are being stimulated by incision caused by straightening and armoring.

Honey Brook shows sediment regime departures only for the upper reach. The lower and upper segments of this reach have been reclassified from Coarse Equilibrium to Confined Source and Transport, and Fine Source and Transport & Coarse Deposition, respectively. Both segments have significant incision ratios, with the lower segment being located in a confined valley, and the upper segment in an unconfined valley (and with no armoring).

With increased stream power prevalent in parts of the study area, sediments are being recruited from upstream reaches and tributaries as downstream reaches attempt to re-establish equilibrium. With primary channel-forming processes usually occurring on an annual or biannual basis during high flows, coarse bedload sediments can take a good deal of time to move through the stream network and be restricted from such movement by constraints such as undersized structures and bedrock constrictions. The larger sediments may only be energized in high flow events exceeding these annual events.

With extensive development in the stream corridor, as is the case with most of the project area, constraints to lateral adjustment also become a stream adjustment-limiting factor. Fill for roads and building is often compacted material that erodes slowly, but more importantly, these features are investments that towns and landowners will willingly invest largely to protect from stream encroachment. Figures 24 and 25 show the extent of lateral constraints in the project area.

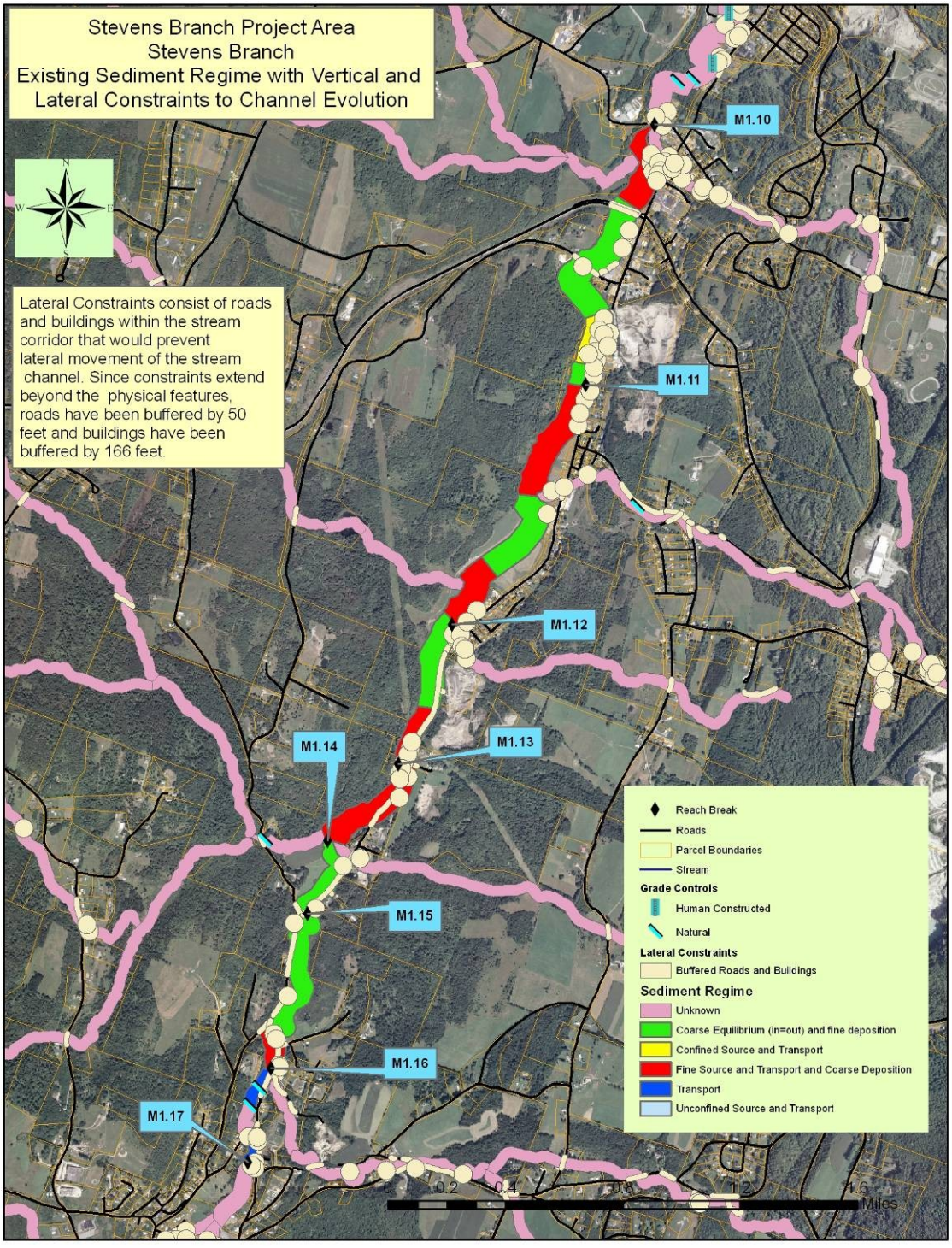

Figure 24. Map of existing sediment regime in conjunction with vertical and lateral constraints to channel evolution for the Stevens Branch reaches within the Stevens Branch corridor planning Project area.

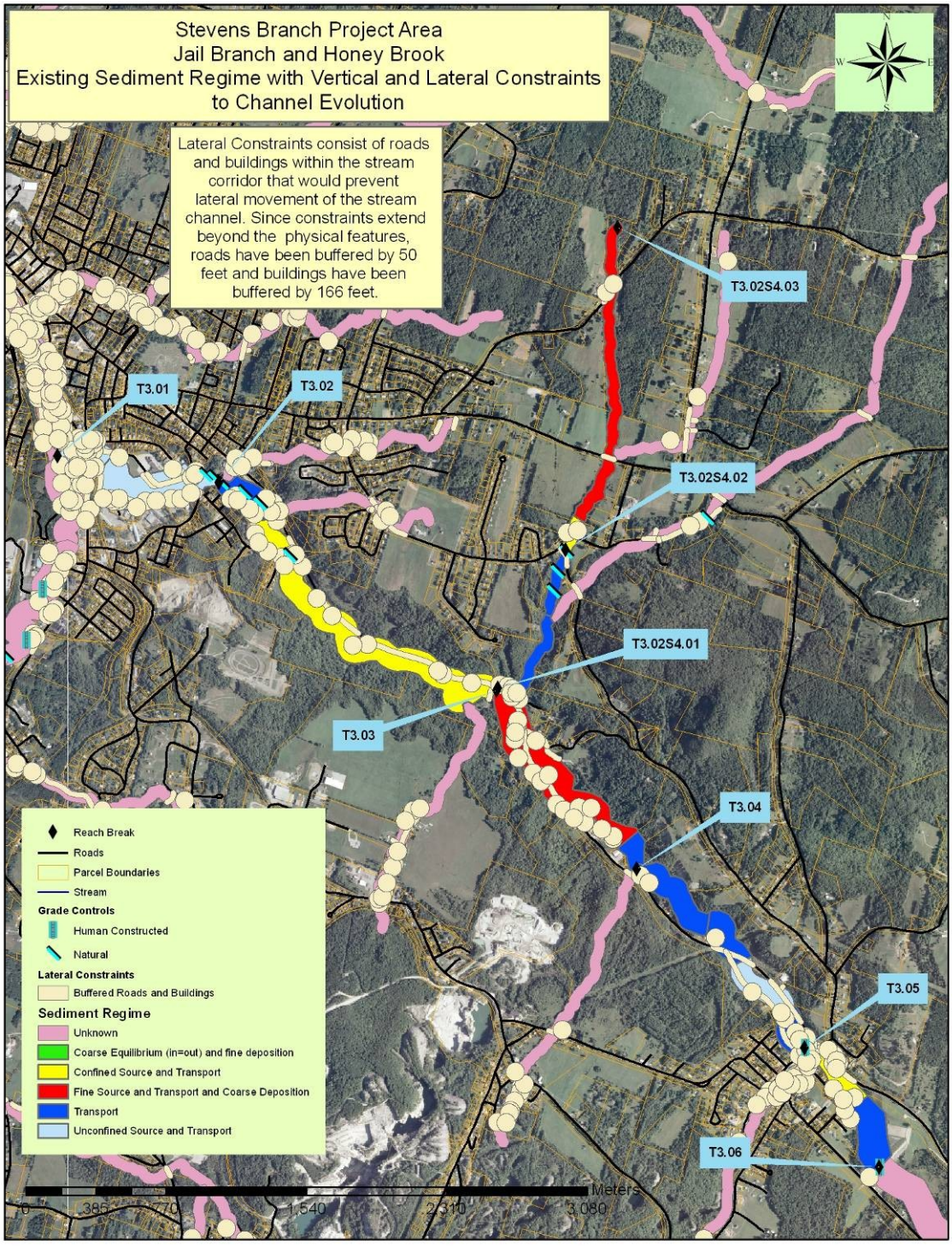

Figure 25: Map of existing sediment regime in conjunction with vertical and lateral constraints to channel evolution for the Jail Branch and Honey Brook reaches within the Stevens Branch corridor planning Project area.

Table 11. Stevens Branch Project area Departure Analysis Table, indicating where river segments are constrained from adjustment, converted to transport streams, and/or have or may someday have potential for attenuating flow and sediment loads

Stevens Branch basin Departure Analysis Table	**Constraints**		**Transport**		**Attenuation (storage)**		
River Segment	**Vertical**	**Lateral**	**Natural**	**Converted**	**Natural**	**Increased**	**Asset**
Stevens Branch mainstem							
M1.10A		Human: roads, development. Armor 5-20%		X	X	X	X
M1.10B		Human: agriculture, roads, 2 bridges, Development Armor 20-50%			X	X	X
M1.10C		Human: development, roads, agriculture Armor 20-50%		X	X		Limited due to development
M1.10D		Human: roads, development			X	X	X
M1.11A		Human: agriculture, development, roads Armor 5-20%		X	X	X	X
M1.11B		Human: agriculture Armor >50%			X		X

Stevens Branch basin Departure Analysis Table	**Constraints**		**Transport**		**Attenuation (storage)**		
River Segment	**Vertical**	**Lateral**	**Natural**	**Converted**	**Natural**	**Increased**	**Asset**
M1.11C		Human: agriculture, roads, development Armor 20-50%		X	X	X	X
M1.12A		Human: agriculture, roads, development Armor 5-20%			X	X	limited
M1.12B		Human: roads, development, agriculture Armor 20-50%		X	X	X	Limited due to encroachment and development
M1.13		Human: development, roads, some agriculture Armor 5-20%		X	X	X	X
M1.14		Human: roads, bridge, development, agriculture Armor >50%			X	X	X
M1.15A		Human: roads, development, agriculture Armor 20-50%			X	X	extensive
M1.15B		Human: roads, bridge, development Armor 20-50%		X	X	X	Somewhat limited: encroachment and development

Stevens Branch basin Departure Analysis Table	**Constraints**		**Transport**		**Attenuation (storage)**		
River Segment	**Vertical**	**Lateral**	**Natural**	**Converted**	**Natural**	**Increased**	**Asset**
M1.16A	Natural ledge	Human: roads, bridge, development	X				very limited
M1.16C		Human: roads, bridge, development	X				limited
Jail Branch							
T3.01A		Human: roads, bridges, development Armor >50%		X	X		No, due to extensive development
T3.01B		Human: roads, bridge, development Armor >50		X	X		No, due to extensive development
T3.02A	Natural Ledge	Human: development, roads	X				Limited due to natural topography
T3.02B		Human: roads, development Armor 20-50%		X	Limited but present	X	Limited, important
T3.03A		Human: roads, bridge, development Armor 20-50%		X	X	X	Limited (mid channel), important
T3.03B		Human: roads, development Armor 20-50%		X			No, due to development and natural topography
	Boulder bed	Human: Roads,	X		Limited		Limited but important

Stevens Branch basin Departure Analysis Table	**Constraints**		**Transport**		**Attenuation (storage)**		
River Segment	**Vertical**	**Lateral**	**Natural**	**Converted**	**Natural**	**Increased**	**Asset**
T3.04A		development					
T3.04B	Boulder bed	Human: Roads, bridge, development Armor >50%	X				No, due to development and natural topography
T3.04C	Boulder bed	Human: Roads, development Armor >50%	X		X		Somewhat limited by road encroachment
T3.04D	Boulder bed Human: Historic Dam: breached	Human: Roads, development Armor >50%	X		Possibly		No, due to development
T3.05A	Boulder bed	Human: Roads, bridge, development Armor >50%	X				Very limited due to development
T3.05B	Human: Flood Control Dam, boulder paved bed	Human: Roads, development Armor >50%	X		X		Limited. Less important due to upstream dam

Stevens Branch basin Departure Analysis Table	**Constraints**		**Transport**		**Attenuation (storage)**		
River Segment	**Vertical**	**Lateral**	**Natural**	**Converted**	**Natural**	**Increased**	**Asset**
Honey Brook							
T3.02S4.01A		Human: bridge, development in lower segment Armor 5-20%	X		X	X	No, due to development
T3.02S4.01B	Natural grade control	Natural bedrock constriction Human: culvert and old bridge constriction	X				
T3.02S4.02A		Human: culvert Armor 5-20%		X		X	
T3.02S4.02B		Human: 2 culverts and old bridge constriction		X	X	X	X

To summarize, the existing sediment regime in the Stevens Branch 2008 study area features limited floodplain access and increased stream power with significant deposition currently occurring even in typical Transport reaches. Erosion, widening, and lateral migration are active processes in most reaches and segments as channel evolution proceeds and these streams attempt to rebuild meanders and floodplains to reestablish equilibrium between this increased stream power and the sediment loads being carried by it. Currently, deposition is primarily occurring when sediment load exceeds carrying capacity, though channel geometry changes sufficiently to decrease stream power in stream segments throughout the study area as well; this appears to be enhancing “fining”

of sediment deposits in overwidened and entrenched portions of the stream channel. The combination of increased stream power and sediment transport in the Project area raises the following issues on the Stevens Branch and its assessed tributaries:

Stevens Branch mainstem:

1. On the Stevens Branch corridor substrates are sands and gravel. Banks are thus easily erodible and susceptible to accelerated levels of erosion as part of a process of channel evolution, as the stream attempts to regain equilibrium.

2. The lack of woody buffers along portions of many segments exacerbates bank erosion.

3. Incision ratios exceed 1.3 on 7 of the 15 segments assessed. Incised streams are less able to flood their banks to reduce flow and sediment loading, and these stressors get transferred downstream.

3. Encroachment and development in this corridor is extensive and has the potential to increase without corridor protection.

4. Areas where the stream corridor has not been developed or encroached upon are often in agricultural use. Frequently the agricultural land has been developed at considerable expense to the farmer (draining of wetland areas).

Jail Branch:

1. Along many parts of the Jail Branch development and encroachment is extreme. The lower reach is entirely within downtown Barre City. This city is likely built on an alluvial fan, a natural area for sediments coming down the Jail to deposit. This creates challenges for the City as sediments build up, particularly in terms of flood impacts and stormwater outfalls maintenance.

2. A historic and ongoing practice of dumping rock and rubble fill along stream banks and in the natural flood plain, as a way to extend fill or to maintain armoring, has created loss of floodplain access and entrenchment issues for many stream segments. In some places the stream channel has been significantly narrowed by this practice.

3. Incision ratios exceed 1.3 on 6 of the 12 segments assessed. For the Jail Branch, an inability to reduce flow and sediment load through flooding is leading to serious sedimentation problems in Barre City, where reduced slopes allow for sediment deposition.

4. Extremely large and unstable mass failures flank the stream's right bank (looking downstream) along four segments in the middle of the assessment area. The potential for ongoing mass failures is assured, and the stream's ability to transport these sediments is in question. Due to the amount of development and number of road crossings in the assessment area, this could cause serious problems.

Honey Brook:

1. Flash flooding on this brook in 2007 and 2008 shows the potential for flood-related damage in this area. The development and road crossing at the very base of this stream

are located in an area that was probably the natural alluvial fan for this tributary, and have borne the brunt of impacts associated with high discharges from extensive wetlands upstream that were likely saturated during these two wet years and then received intense localized storms on top of that saturation, augmented by concentrated stormwater inputs. Indications are that the upstream wetlands have been altered historically, and water moves in a much narrower valley than was available at one time; the segments below this area function as Transport reaches transferring the heightened impacts to the base of the stream. The undersized bridge at the base of the stream appears to exacerbate depositional tendencies and dispersal of floodwaters across the "fan" area. Two houses were bought-out after the flooding, but the new owner of the old Dugout Restaurant did not participate and is intending to renovate, and further development has occurred in the Jail Branch floodplain just upstream of this confluence/fan area since the houses were removed.

2. Extensive historic incision appears to have occurred in the upper reach, creating significantly narrowed stream valleys. The increased streamflow that results from this loss of flood plain attenuation services then transfers downstream during high flows, creating intensified erosional forces.

3. Mass failures and gully formation are significant in the lower segment of the downstream reach. These features will continue to add significant amounts of sediment into the system during high flows for at least the next five to ten years at a minimum.

5.2 SENSITIVITY ANALYSIS

The preceding departure analysis identifies the watershed and reach-scale stressors that help explain the sediment regime departure currently existing in the Stevens Branch corridor planning Project area. Designing stream corridor protection and restoration projects that are compatible with channel evolution processes, and prioritizing them at the watershed scale, also require an understanding of stream sensitivity.

Sensitivity refers to the likelihood that a stream will respond to a watershed or local disturbance or stressor, and an indication as to the potential rate of channel evolution (VT ANR 2007 Protocols, Phase 2, Step 7.7; VT ANR RCPG 2007, Section 5.2). While every stream changes in time, a sensitivity rating indicates that some streams, due to their setting and location within the watershed, are more likely to be in an episodic, rapid, and/ or measurable state of change or adjustment.

Alteration of sediment and flow regimes (conversion of many segments from equilibrium to transport function), erodible boundary conditions, and relatively high levels of current aggradation are indicative of high to extreme sensitivity in many reaches and segments. Stream type departures (indicating a change from the reference-type channels indicated by Phase 1 analysis; see Appendix A for stream type classification) were indicated for 8 of the 31 segments assessed in Phase 2 (Fig. 26). Four of these are degradational stream type departures, converting B or C channels to F (highly entrenched and overwidened) stream types. Three of these are on the Jail Branch and are the result of extensive channel encroachment and artificial filling of the valley floodplain. Coarse sediments associated with the upper reaches of the Jail bring overall Sensitivity levels down. Extreme ratings

are noted for two downstream reaches with less coarse substrate and Stream Type Departures of C or B to F. Honey Brook segment T3.02S4.02A indicated a C to B Stream Type Departure (moderately entrenched). This is indicative of the loss of floodplain access, with attendant increased stream power impacts, that is a major contributor to elevated stream sensitivity.

The other four STDs, on the Stevens Branch mainstem, were all E to C stream type changes (Fig. 26). A high number of Extreme sensitivity ratings occur in this area, in part due to the fine sediments that dominate the area, and the STDs are related to the widening and aggradational processes noted in many of the Stevens Branch reaches. The segments in this area with Very High rather than Extreme sensitivity ratings were the C streams resulting from these departures which are in a process of aggradation and stabilization after a period of widening.

Stevens Branch: Although reduced floodplain access on the Stevens mainstem clearly affects many reaches, high sediment loads and sensitivity ratings of these same reaches indicate good possibilities for success using passive geomorphic projects; these types of projects allow the river to use its own energy and watershed inputs to reestablish its meanders, floodplains, and self maintaining equilibrium conditions over time. It should be noted, however, that given the erodible banks of the river alternating with stretches of straightened river and increased stream power, continued planform change in these areas will likely include elevated erosion. Providing ample room for these processes to occur will be a critical aspect of restoration efforts. Efforts to curtail these processes through bank armoring or similar efforts will arrest these evolution processes (temporarily) and could dramatically delay reestablishment of equilibrium conditions.

Jail Branch: Due to the extensive development and infrastructure associated with the stream valley, this section of river poses major challenges for channel adjustment. Project potential is highest in the middle of the study area, in T3.02B and T3.03A, where the stream is stabilizing after a period of incision and widening. It is critical that the stream corridor in these areas is protected from further encroachment and development. These are essentially the only prospects for attenuation in the entire project area. Since Barre City is very susceptible to flooding, it is important to manage sediment movement through the system in a way that does not raise streambed levels in the city area.

Honey Brook: Corridor protection is important for these two reaches. Development already exists at the base of the lower reach, but since the recent flooding, there will be some alterations there and it could be an important time to educate landowners about stream processes, corridors, and buffers. Undersized culverts are also causing problems on this tributary and provide project possibilities. Such opportunities are analyzed more thoroughly and discussed in more detail in Section 6, preliminary project identification, of this report.

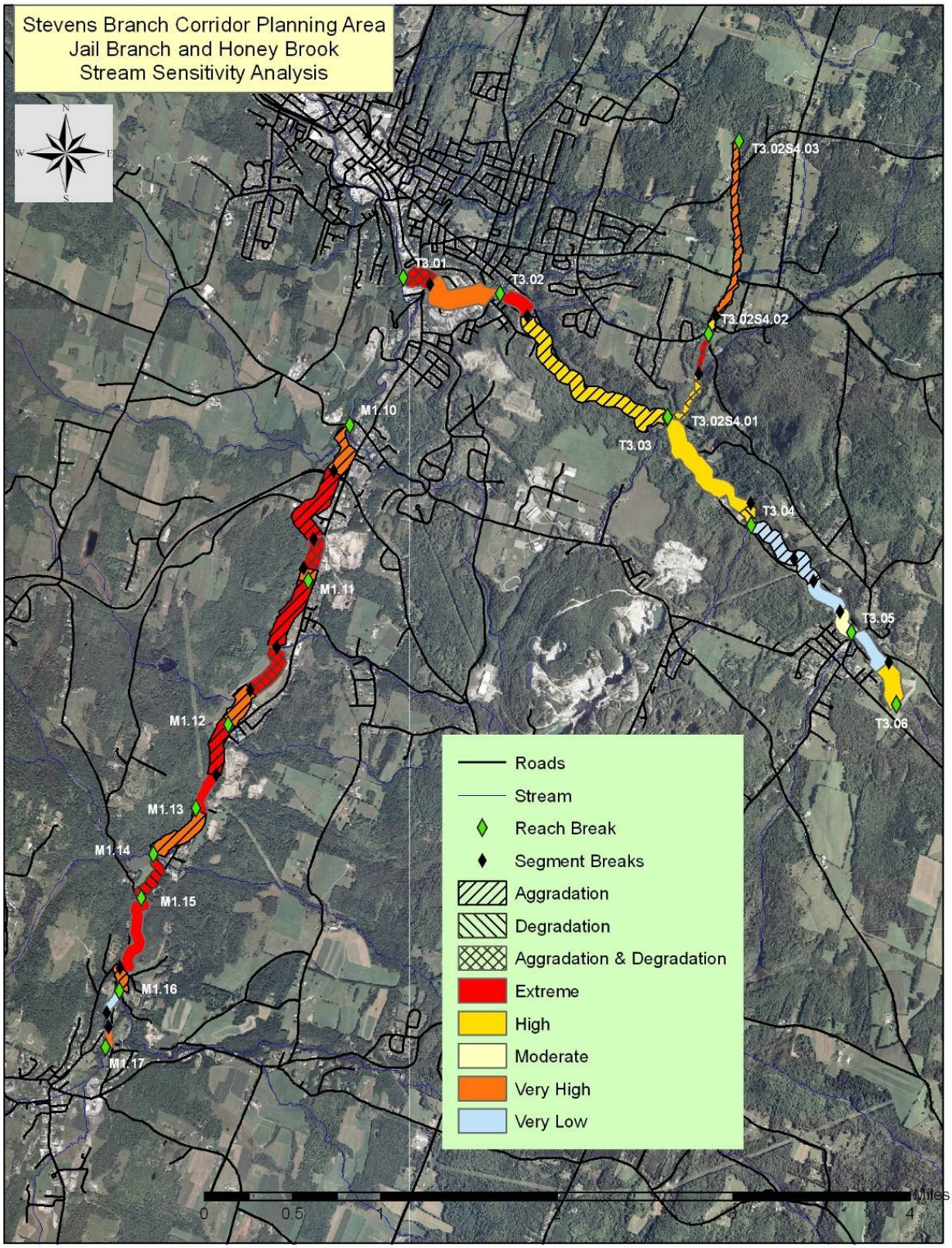
Stevens Branch Corridor Planning Area
Jail Branch and Honey Brook
Stream Sensitivity Analysis
N
W
E
S
T3.02S4.03
T3.01
T3.02
T3.02S4.02
M1.10
T3.02S4.01
T3.03
T3.04
M1.11
T3.05
T3.06
M1.12
M1.13
M1.14
M1.15
M1.16
M1.17
Roads
Stream
Reach Break
Segment Breaks
Aggradation
Degradation
Aggradation & Degradation
Extreme
High
Moderate
Very High
Very Low
0
0.5
1
2
3
4
Miles

Figure 26: Stream Sensitivity Analysis and Stream Type Departures for the Stevens Branch 2008 assessment area. Stream type departures are depicted as aggradational, degradational, or a combination of the two.

6.0 PRELIMINARY PROJECT IDENTIFICATION

The preceding departure and sensitivity analysis provides the watershed and reach-scale background to inform prioritization and selection of projects in a manner that maximizes their effectiveness and reduces the likelihood of failure, specifically by assessing underlying causes of channel instability. With the information from these maps and tables, a stepwise process has been conducted to identify the following actions, in order of priority, in a manner designed to facilitate restoration of the stream to equilibrium conditions (VT ANR RCPG 2007, Ch. 6; chapter number is included here with the step):

6.1. Protecting river corridors
6.2. Planting stream buffers
6.3. Stabilizing stream banks
6.4. Arresting headcuts and nick points
6.5. Removing berms and other constraints to flood and sediment load attenuation
6.6. Removing/replacing structures (e.g., undersized culverts, constrictions, low dams)
6.7. Restoring incised reaches
6.8. Restoring aggraded reaches

As indicated in Section 5.2 of this report, the high to extreme sensitivity rating of many reaches in the Stevens Branch Project area indicate that passive geomorphic projects, particularly given the high sediment load of the Stevens and its tributaries, is generally an appropriate management alternative in the Project area. Encroachment issues are commonplace, however, placing a particularly high priority, throughout the Project area, on Step 6.1, protecting river corridors, identified in the stepwise procedure. Step 6.2, Planting stream buffers should also receive a high priority, as there appears to be a strong relationship in the study area between extent of vegetated cover and erosion impacts (see Section 5.1.3c, Boundary Conditions and Riparian Modifiers). The third item (Step 6.3), stabilization of stream banks, is generally not recommended due to vertical instability in all reaches and continuing widening in channel evolution processes, increasing the likelihood of failure of such efforts, as well as escalating maintenance costs. This recommendation needs to be carefully assessed with regard to site-specific recommendations and critical infrastructure. It should be stressed again, however, that the current conversion of many of the sediment regimes in assessed reaches to transport types means that further armoring of banks or bed will likely intensify downstream deposition and flooding impacts. Incision is prominent in four of the Stevens Branch reaches and seven of the Jail Branch reaches. Headcuts or nick points, however, were not associated with these reaches. Step 6.4, for these reaches, is an item to be regularly assessed, however, since further downcutting of the channel could initiate further channel adjustments and delay establishment of equilibrium conditions. One berm was located on segment T3.01B. This berm protects the high school playing fields from flooding. Step 6.5, Removing Berms, should be evaluated for this segment to determine the feasibility of

accessing flood plain in this way. Step 6.6, Replacing Structures, has some good applicability on Honey Brook, in particular. Steps 6.7 and 6.8, which involve more active restoration efforts, would require careful consideration (likely involving engineering-grade surveys and analysis) in this project area.

6.1 REACH DESCRIPTIONS—PRELIMINARY PROJECT IDENTIFICATION

With these overarching considerations, preliminary project identification for the Stevens Branch Project area is presented on a reach-by-reach basis in the following pages. "Left bank" and "right bank" in the reach descriptions are referenced looking downstream. Background imagery for the reach maps is from the National Agricultural Imagery Program (NAIP), dated 2003. Valley walls delineated on the reach maps are based on the Phase 2 field verification of Phase 1 valley walls.

6.1.1 Reach M1.10 - Stevens Branch mainstem from just upstream of the Bridge Street bridge to just above tributary that crosses Route 14 approximately 900 feet north of Morris Drive

Reach M1.10 comprises 7264 feet (1.38 miles). It begins just upstream of the Bridge Street bridge, approximately 1500 ft south (upstream) of the junction of the Stevens Branch mainstem and Jail Branch. The reach was segmented into four segments during the Phase 2 assessment (Fig. 26). The valley for this entire reach has been reduced by approximately 50% by historic filling of the valley on the east side in order to facilitate development. The Phase 1 process classified this reach as E dune-ripple with a sand substrate. Segments B and C maintained this classification, but segments A and D have both widened to the extent that they have had a stream type departure from E to C.

Segment M1.10A extends from the Bridge Street bridge to just downstream of Route 63. The segment is characterized by a patchwork of former small fields and pasture, now either maintained in agriculture or converted to residential areas with lawns and clearings intermixed with wooded lands along the stream bank. Historic (1924) topos show a railroad line along this segment (http://docs.unh.edu/VT/barre24ne.jpg) (Fig. 3). Downstream of this reach it was on the west bank, crossing over to the east side just upstream of the Bridge Street bridge and continuing along the floodplain on the river side of Route 14 until just after Snowbridge Road, where it crosses the road and runs along the valley wall. The 1957 topo indicates that by this time the railroad was no longer present here. Neither of the topos show the new Route 63, which appears completed in photos from February 1971 (UVM LCP 2009). Soils maps show the entire floodplain for this segment to be hydric soils. The valley is now in residential and agricultural use, an indication that this area has been extensively manipulated and drained. This segment appears to have had the potential to play a vital role as an attenuation asset upstream of Barre City, but is currently limited for such possibilities by wetland conversion and corridor encroachments. Key features of this segment include:

- Dominant buffers for both banks are 0-25 ft, with some 25-50 on the right bank.
- Road encroachment is found on one side for 50% of the segment.
- Development is mostly on the east side and is also found in almost 50% of the segment.
- The stream is in stage III, and widening and aggradation have occurred to the extent that there has been a Stream Type Departure from E to C.
- Substrate is sand and sensitivity rating is Very High

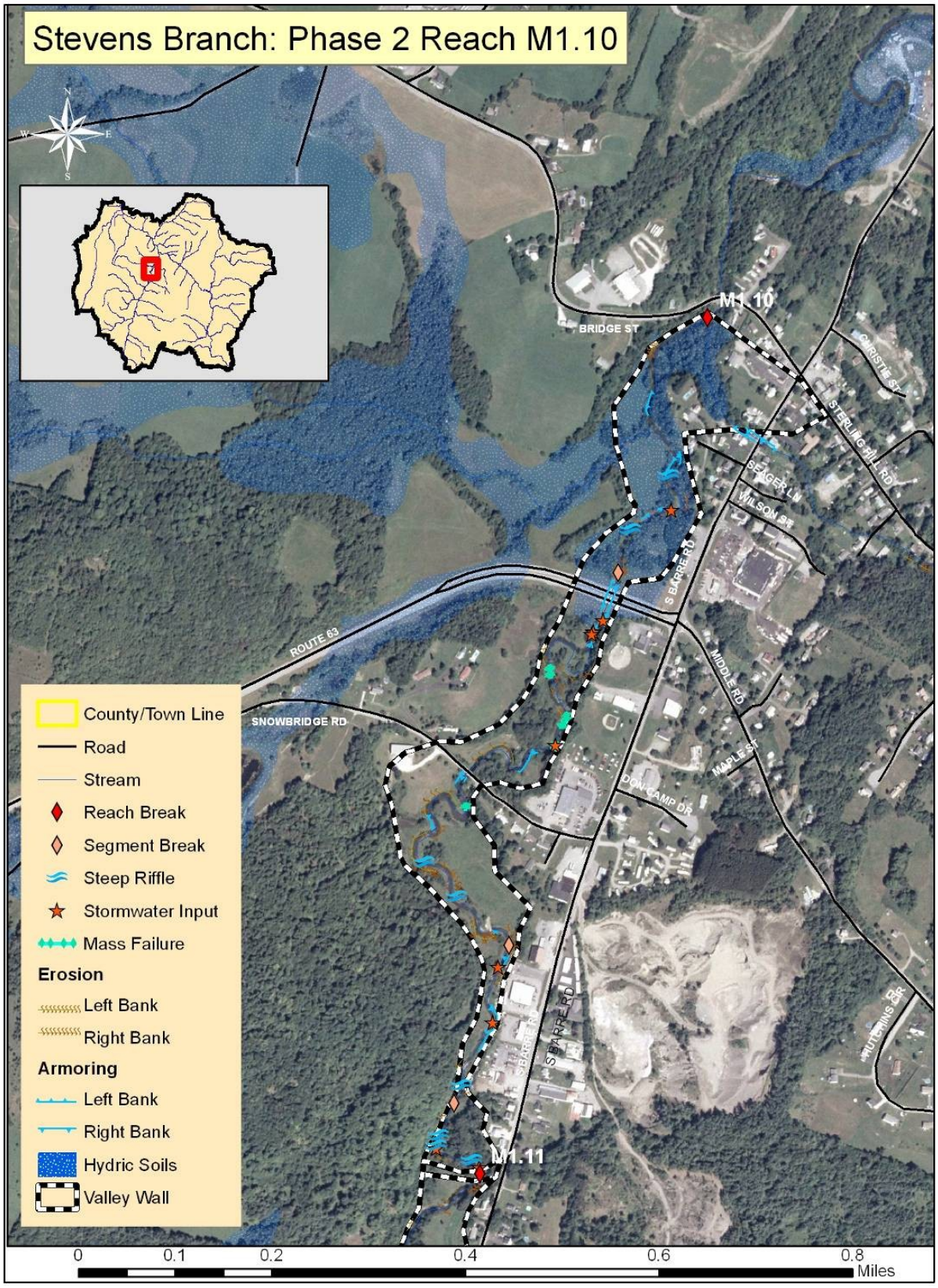
Stevens Branch: Phase 2 Reach M1.10
M1.10
M1.11
BRIDGE ST
ROUTE 63
SNOWBRIDGE RD
S BARRE RD
MIDDLE RD
MAPLE ST
DONCAMP DR
STERLING HILL RD
SEAGER LN
WILSON ST
CHRISTIE ST
HUTCHINS DR
County/Town Line
Road
Stream
Reach Break
Segment Break
Steep Riffle
Stormwater Input
Mass Failure
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
Hydric Soils
Valley Wall
0
0.1
0.2
0.4
0.6
0.8
Miles

Figure 27: Reach M1.10 of the Stevens Branch mainstem.

Segment M1.10B continues up from just downstream of the Route 63 double-box-culvert crossing to approximately 1760 feet upstream of the Snowbridge Road bridge, where extreme encroachment begins on the right bank and the stream has been straightened.

This segment is 3889 feet in length, and like segment A appears to have been surrounded by a mosaic of farmland and forest historically. The 1924 topo shows no development on either side, other than Route 14 and the RR to the east of that. The 1957 topo shows some development along the right bank, mostly along Snowbridge Road. Currently there is continuous development along the right bank, as well as some on the left bank upstream of the Snowbridge Rd. bridge. There are three bridges/culverts in this segment: the double box culvert for Route 63 (a four lane highway), a bridge at Snowbridge Rd., and a small VAST (Vermont Association of Snowmobile Trails) bridge in the upper part of the segment. This segment also appears to have a fair amount of potential to play a role as an attenuation asset upstream of Barre City, particularly in the upstream portion of the segment. It is somewhat limited by corridor encroachments. Key features of this segment include:

- Sub-dominant buffers for both banks are 0-25 ft, with more than 1,500ft of buffer <25ft for both banks (Fig 27).
- Development is mostly on the east side and is extends for more than 30% of the segment.
- There are 5 stormwater inputs from the east side.
- Mass failures and bank erosion are common.
- The stream is in stage III with both aggradation and widening occurring .
- Substrate is sand (although not hydric) and sensitivity rating is Extreme

Figure 28: Segment M1.10B features, clockwise from top right: mass failure with stormwater pipe, depositional bars, mass failure with narrow buffer, typical bank erosion with no buffer.

Segment M1.10C is 963 feet long and has been straightened in its entirety. The right bank has been armored for more than 1/3 of its length. The right bank has also been completely developed and across Route 14 is a large active gravel pit. It is not clear that sediments from this pit reach the stream, but there are two storm water pipes located in this segment which increase flow. Key features of this segment include:

- Dominant buffer for RB and sub-dominant buffer for LB is 0-25 ft. Total of 1400+ ft of buffer < 25ft (Fig 28).
- Encroachment on the east side extends the entire length of the segment
- Development on the east side extends the entire length of the segment
- There are two stormwater inputs to the east bank
- Straightening encompasses the entire segment
- The RB has been armored for more than 30% of its length
- The stream is in stage II, still incising with widening starting to occur
- Substrate is sand (although not hydric) and sensitivity rating is Extreme

Figure 29: Example of elevated encroachment/development on RB in segment M1.10C.

Segment D is 575 feet long and has been left in a more natural state than segment C. Floodplain forest is present on both sides. A severely eroded tributary enters this segment at the upstream end and increases both flow and sediment load to this segment. Historic incision, combined with an abundance of coarse woody debris, has led to channel widening to the extent that there has been a Stream Type Departure from E to C. This widening and abundance of coarse woody debris has in turn led to aggradation and planform adjustments. This segment is approaching stage IV. This segment is very short, but its broad forested floodplain provides important attenuation.

Key features of this segment include:

- There is a tributary input at the top of the segment that is extremely eroded and significantly increases flow and sediment load; further upstream headcut migration could potentially begin to undermine Rte. 14 (Fig 29).
- The stream is in stage III with both aggradation and widening occurring.
- Bank erosion is present along the LB.
- Substrate is sand (although not hydric) and sensitivity rating is Very High

Figure 30: Segment M1.10D tributary has scoured a channel back towards Route 14 (seen in the background). Culvert at road is now elevated significantly above tributary floor, and further upstream migration of a headcut could start to undermine the road.

Table 12.Stevens Branch Segment M1.10 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.10A	Protect river corridor	High	High	N	Opportunities limited by encroachment; valuable attenuation asset upstream of important urban center
M1.10B		High	High		
M1.10C		High	High		

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.10D (1)		High	High		
M1.10A M1.10B (2)	Plant stream buffer	Low High	Low High	Y	Primarily low cost: very high to extreme sensitivity, major current adjustments
M1.10B (6)	Replace Existing Structure	Low	Low	Y	When bridge is due to be replaced consider a structure

6.1.2 Reach M1.11 - Stevens Branch mainstem from just above tributary that crosses Route 14 approximately 900 feet north of Morris Drive to just upstream of tributary that enters from across Route 14 between Morin Road and Kings Row.

Reach M1.11 comprises 5136 feet (0.97 miles). It begins just upstream of the tributary that enters the Stevens Branch mainstem from across Route 14 approximately 900 feet north of Morris Drive (Fig 30). The reach was segmented into three segments during the Phase 2 assessment. The downstream segments A and B are 3048 and 1715 feet long. The Phase I process classified this reach as an E dune-ripple stream with a sand substrate. Segments A and B retain this classification, but segment C has widened to the extent that it has had a stream type departure of an E to C-type classification. The valley for this entire reach has been reduced significantly by historic filling of the valley on the east side in order to facilitate development and road building. This is particularly true for Segments A and C.

Segment M1.11A extends from the downstream reach point to just upstream of a small tributary that enters from the east at the site of some streamside development along the Stevens Branch mainstem. This is also the beginning of more extensive agricultural activity along the left bank. This segment includes cultivated cropland along its right bank. Soils maps show some hydric soils in the upstream half of the segment. The area of hydric soils is 200-400 feet wide in this area and could be expected to provide a moderate amount of attenuation in this area. Development and agriculture have reduced the effectiveness of this wetland area. There has been straightening in the mid-section of this segment, presumably for agricultural reasons. This segment has widened to the extent that it has almost caused a Stream Type Departure from an E to C stream type. Key features of this segment include:

- Sub-dominant buffers for both banks are 0-25 ft, with more than 900ft of buffer <25ft for both banks.
- Development is mostly on the east side and is extends for almost 30% of the segment but is often at some distance from the stream channel.
- This is a small bridge causing a channel constriction in mid-segment.
- There are 2 stormwater inputs from development on the east side.
- Bank erosion is common; >20% on both sides.
- The stream is in stage III with both aggradation and widening occurring (Fig 31)
- Substrate is sand and sensitivity rating is Extreme

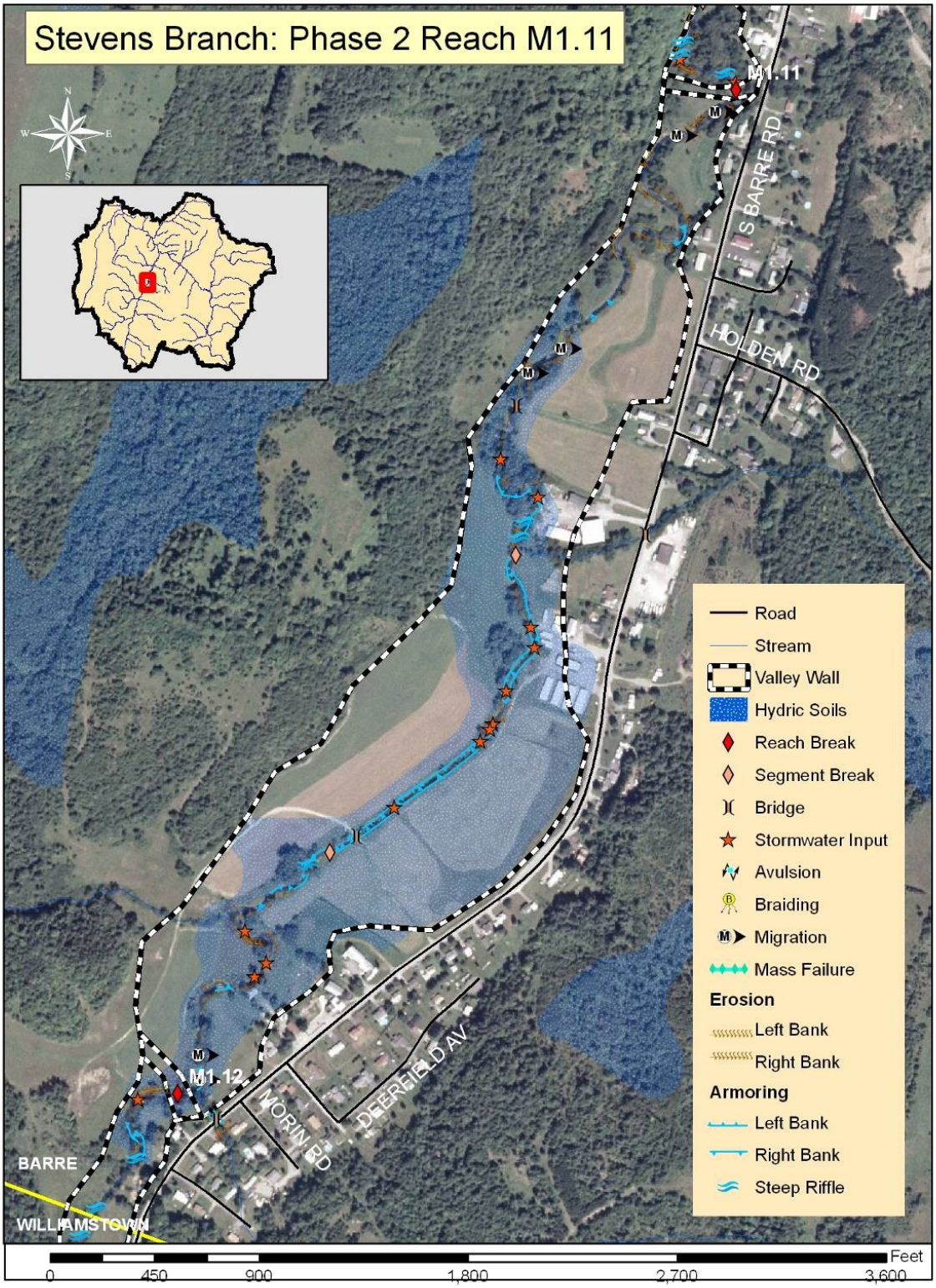

Figure 31: Reach M1.11 of the Stevens Branch mainstem.

Figure 32: Segment M1.11A is showing signs of widening and aggradation.

Segment M1.11B continues upstream from the top of Segment A and ends approximately 130 feet upstream of a small farm bridge, where the stream is no longer extensively straightened and armored. The entire length has been straightened (Fig 32). Almost the entire right bank and more than 50% of the left bank have been armored. Cultivated cropland dominates the segment on both sides, with some development crowding the right bank at the downstream end. This entire segment's floodplain on the right bank appears on soil maps as hydric soils. Drainage ditches are visible on orthophotos, indicating that these fields are actively being drained to facilitate agriculture. This segment probably had significant attenuation benefits historically, an asset that has been diminished through agricultural practices. Numerous stormwater inputs in this segment indicate the degree with which development and agricultural ditches impact wetland attenuation and stream flow. Key features of this segment include:

- Dominant buffers for both banks are 0-25 ft, with more than 1,000ft of buffer <25ft for both banks.
- Development is mostly on the east side and covers more than 20% of the segment but is generally at some distance from the stream bank.
- There are 7 stormwater inputs from agriculture and development on the east side.
- Armoring is extensive, greater than 1,000ft in length on both sides.
- The stream is in stage II with incision dominant and widening being arrested by armoring.
- Substrate is sand and sensitivity rating is Extreme

Figure 33: Segment M1.11B has been extensively straightened and riprapped. Farm bridge structure is a channel constriction.

Segment M1.11C continues from upstream of the small farm bridge to the top of the reach. This section of stream has seen some straightening but retains much of its natural planform. There is no road encroachment for this segment but development is common along the right bank and cultivated cropland is present along both banks. Soil maps show much of this segment to be bordered by hydric soils. Development and agricultural uses appear to have eliminated any visible sign that this segment was bordered by wetland. This segment has had a stream type departure from E to C due to extensive widening. If the stream continues to stabilize, it can be expected to return to an E stream classification. Key features of this segment include:

- Dominant buffer on LB and sub-dominant buffer on RB is 0-25 ft, with more than 850ft of buffer <25ft for both banks.
- Development is mostly on the east side and is extends for more than 30% and is close to stream banks.
- There are 3 stormwater inputs from agriculture and development on the east side.
- Armoring is close to 20% on the right bank.
- The stream is in stage IV; historically incised and widened and now stabilizing.
- Substrate is gravel and sensitivity rating is Very High

•

Table 13.Stevens Branch Segment M1.11 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.11A M1.11B M1.11C (1)	Protect river corridor	High High High	High High High	N	Valuable attenuation asset upstream of important urban center. Allow natural planform to re-establish on segment B, if landowner can be persuaded Explore channel management easement options
M1.11A M1.11B M1.11C (2)	Plant stream buffer	High High High	High High High	Y	Primarily low cost: very high to extreme sensitivity, major current adjustments on segment A, arrested adjustment on segment B
M1.11A M1.11B (6)	Replace Existing Bridge Structures	Low	Low	Y	When bridges are due to be replaced consider structures that allow for more lateral movement of the stream

6.1.3 Reach M1.12 - Stevens Branch mainstem from just upstream of tributary that enters from across Route 14 between Morin Road and Kings Row to just south of the intersection between Route 14 and Farnham Road (Figure 34).

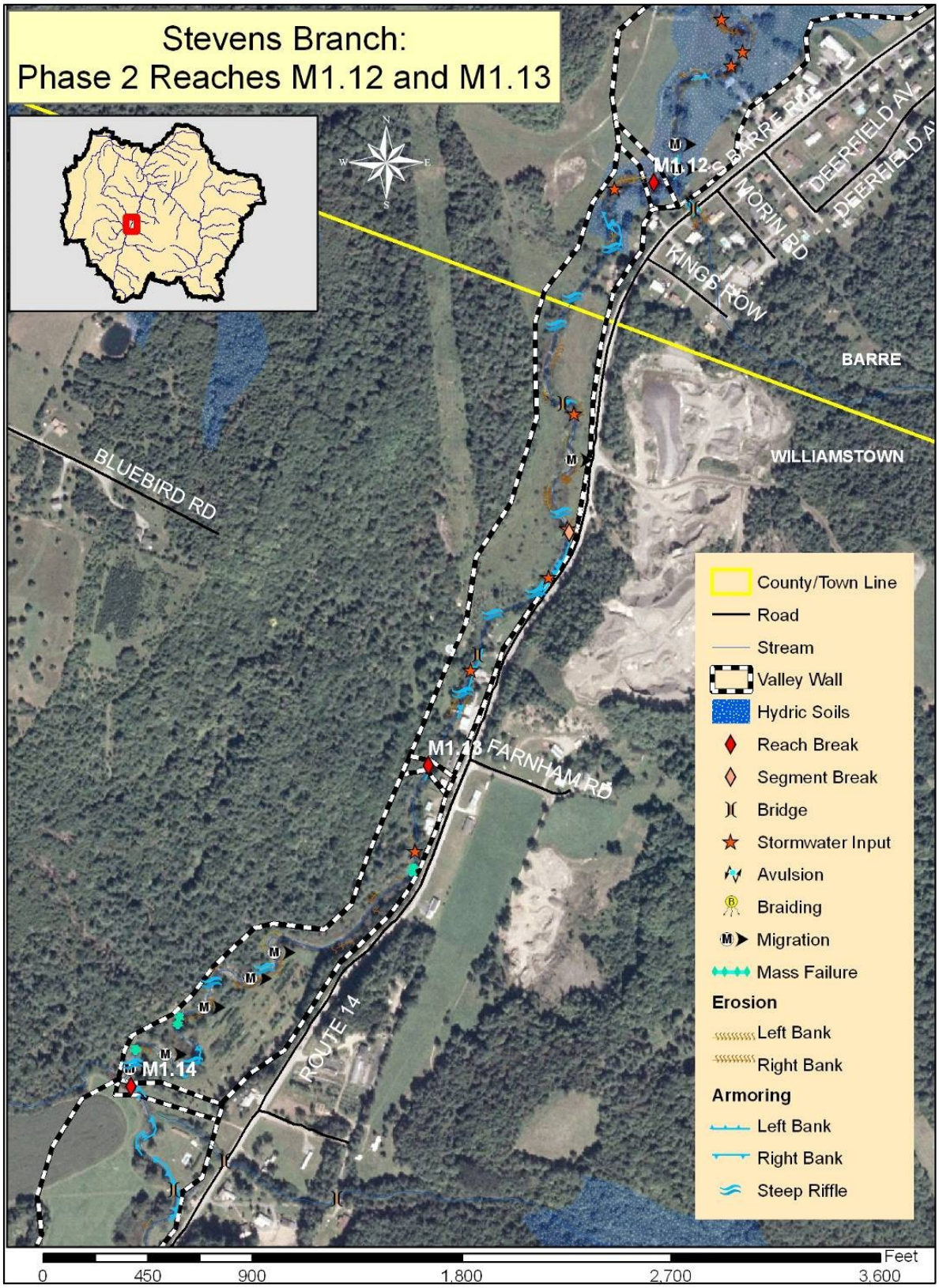

Figure 34: Reaches M1.12 and M1.13 on the Stevens Branch mainstem.

Reach M1.12 is 3,126 feet long in total, beginning in the Town of Barre and continuing into the Town of Williamstown. It has two segments, 1,910 and 1,216 feet in length. The Phase I process classified this reach as an E riffle-pool stream with a gravel bed. Both segments retained this classification in the Phase 2 assessment process. Soils maps show a small amount of hydric soils in the very downstream end. The valley has been somewhat, but not extensively, narrowed by the encroachment of Route 14 on the east side.

Segment M1.12A begins at the top of Reach M1.11 and ends where the stream and Route 14 come together and where the stream begins to be straightened. Segment M1.12A looks to have been straightened in the middle section, but retains some of its natural planform. The downstream end of this segment includes hydric soils along both banks. Key features of this segment include:

- Dominant buffer on RB and sub-dominant buffer on LB is 0-25 ft, with more than 800ft of buffer <25ft for both banks.
- There are 3 stormwater inputs from road and field ditches on the east side.
- The stream is in stage IV, historically incised and widened and now stabilizing.
- Substrate is gravel and sensitivity rating is Extreme.

Segment M1.12B begins where the road begins to be right along the right bank, and continues upstream to just south of the Farnham Road and Route 14 intersection, which is in the middle of a stretch of dense stream-side development between the Stevens and Route 14. Almost the entire length has been straightened and encroachment and development are extensive (Fig 34). Key features of this segment include:

- Dominant buffer on RB and sub-dominant buffer on LB is 0-25 ft, with more than 1,000ft of buffer <25ft on the right bank.
- There are two stormwater inputs from the road and development on the east side.
- Armoring is present on nearly 50% of the right bank.
- A small footbridge crosses the stream at the base of the developed area. Landowners say that a similar bridge washed out in 2008 high flows.
- The stream is in stage III, showing some historical incision and currently widening and aggrading, particularly where riprap is not arresting lateral movement.
- Substrate is gravel and sensitivity rating is Extreme.

Figure 35: Segment B of Reach M1.12 has been extensively encroached upon and developed along its right bank.

Table 14.Stevens Branch Segment M1.12 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.12A M1.12B (1)	Protect river corridor	High High	High High	N	Valuable attenuation asset upstream of important urban center. Left bank protection is critical in segment B to allow stream some planform adjustment.
M1.12A M1.12B (2)	Plant stream buffer	Low Low	Low Low	Y	Primarily low cost: very high to extreme sensitivity, major current adjustments on segment A, arrested adjustment on segment B. Allowing buffers to revegetate naturally might be enough
M1.12A (6)	Replace Existing Bridge Structures	Low	Low	Y	When bridge is due to be replaced consider structure that allows for lateral movement of the stream and a location that is not so close to meander bends.

6.1.4 Reach M1.13 - Stevens Branch mainstem just south of the intersection between Route 14 and Farnham Road to just upstream of tributary entry from the west, at the south end of agricultural fields.

Reach M1.13 is 2,714 feet long and was not segmented, although the lower half is somewhat more confined and shows some evidence of straightening. The valley has been considerably narrowed by Route 14 encroachment and development. The upper half of the reach has a wider valley and more natural planform (Fig. 33). Widening has occurred in this reach to the extent that there has been a stream type departure of E to C. Key features include:

- Sub-dominant buffer on RB is 0-25 ft with 722 feet of buffer <25ft.

- There has been straightening along more than 40% of the reach.
- Bank erosion and mass failures are common. RB has more than 20% erosion.
- The stream is in stage IV. Having historically incised, it has been widening and is now beginning to aggrade and stabilize.
- Substrate is gravel and sensitivity rating is Very High

Figure 36: M1.13 is widening and aggrading (left), and areas of bank erosion are common (right).

Table 15.Stevens Branch Segment M1.13 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.13 (1)	Protect river corridor	High	High	N	Valuable attenuation asset upstream of important urban center. Protection particularly important in the upper reach, which has a wider valley and is less encroached upon.
M1.13 (2)	Plant stream buffer	Low	Low	Y	Primarily low cost: very high to extreme sensitivity, considerable bank erosion. Allowing buffers to continue to

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
					revegetate naturally might

6.1.4 Reach M1.14 - Stevens Branch mainstem from just upstream of tributary entry from the west at the south end of agricultural fields (west of Hulbert Road) to just upstream of bridge crossing on Route 14, north of Fallsbridge Road.

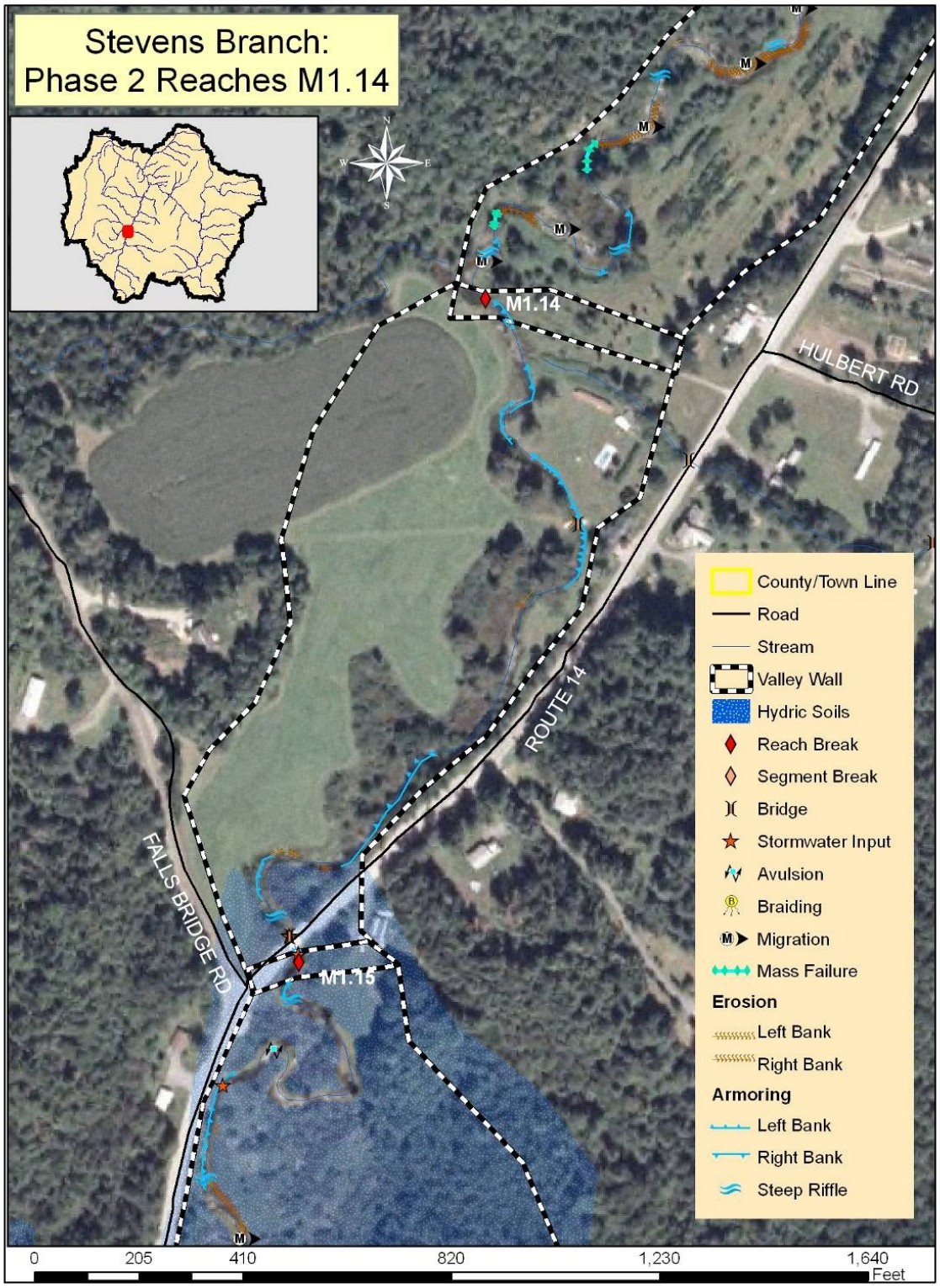

Figure 37: Stevens Branch reach M1.14

Reach M1.14 is 1,812 feet long and was not segmented. The valley has been somewhat narrowed by Route 14 encroachment and development. Agriculture dominates the land

use on the west side (Fig 37) and encroachment and development dominate the east side. The Phase I process classified this reach as an E dune-ripple stream with a sand bed, which was confirmed in the Phase 2 assessment. Key features include:

- The dominant buffer on the RB and the sub-dominant buffer on LB is <25 ft.
- There has been straightening along more than 75% of the reach.
- The stream bank on the RB has been armored for 40% of its length.
- The stream is in stage II, actively incising after straightening and armoring.
- Substrate is sand and sensitivity rating is Extreme.

Figure 38: Stevens Branch reach M1.14 showing agricultural use on the west side (left) and encroachment and armoring on the east side (right)

Table 16. Stevens Branch Segment M1.14 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.14-0 (1)	Protect river corridor	High	High	N	Valuable attenuation asset upstream of important urban center.
M1.14-0 (2)	Plant stream buffer	Moderate	Moderate	Y	Primarily low cost: very high to extreme sensitivity, some bank erosion. Agricultural fields on left bank mostly buffered but not 100%.

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.14-0 (6)	Replace Existing Bridge Structures	Moderate	Moderate	Y	When bridge is due to be replaced consider structure that allows for more lateral movement of the stream.

6.1.5 Reach M1.15 - Stevens Branch mainstem from just upstream of bridge crossing on Route 14, north of Fallsbridge Road to just downstream of private bridge (upstream of tributary confluence) in the vicinity of Zampieri Drive.

This reach is 4,464 feet long and has two segments, 3,611 and 853 feet in length. This reach has the widest valley of any reaches assessed in the 2008 study, and soil maps show almost all of the valley to be hydric soils; land use/land cover maps show much of the east side valley to be forested wetland (Fig 38). This reach has the potential to be an important asset for attenuation. The Phase I process classified this reach as an E riffle-pool stream with a gravel bed. M1.15A retained this classification in the Phase 2 assessment process. M1.15B was classified as a C riffle-pool stream with a gravel bed. This change might be due to the widening process that has been occurring in this segment, but also might be indicative of the transition between the wide valley, meandering, classic E-stream setting found in M1.15A, and the semi-confined valley, straighter and steeper B-type stream setting found in the next reach (M1.16) upstream.

M1.15A comprises most of the length of the reach. The stream is full of sinuous meanders and appears to be very dynamic. Bank erosion is very common, as are channel planform adjustment indicators. Key features include:

- Dominant buffer on LB is 0-25 ft, with more than 30% of the segment length having a buffer <25ft.
- There are three stormwater inputs from the road on the west side and development on the east side.
- Erosion is very common with more than 20% mapped as erosion for both banks.
- Bank armoring only covers about 10% of the segment length (both sides) but is concentrated at the upstream end of the segment.
- There are 7 flood chutes and an avulsion mapped for the segment. The avulsion occurred at the downstream end and significantly changed the course of the stream in that location.
- The stream is in stage III, showing some historical incision but with widening, aggradation, and planform change dominating the active processes (Fig 39).
- Substrate is gravel and sensitivity rating is Extreme.

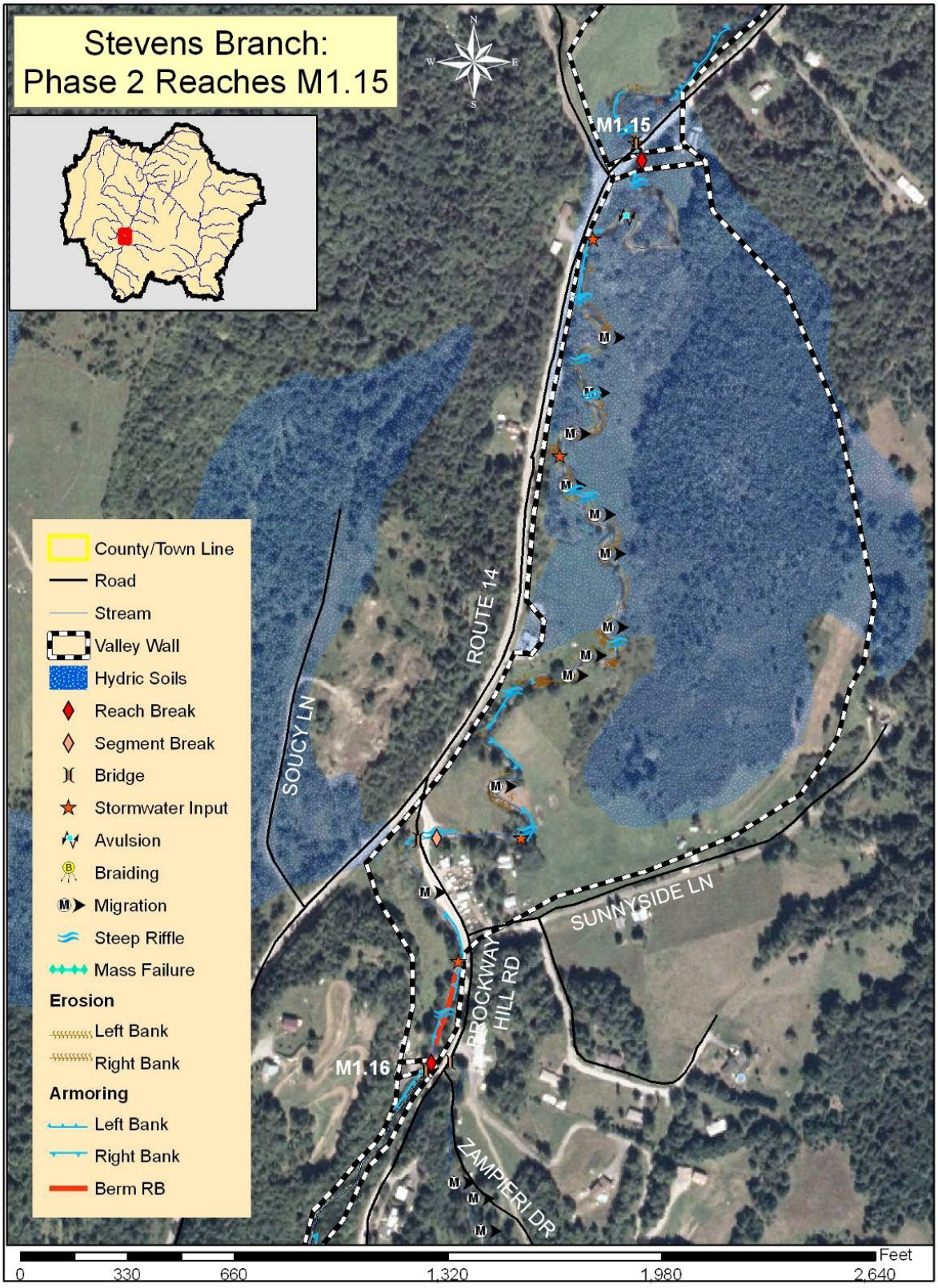
Stevens Branch:
Phase 2 Reaches M1.15
M1.15
M1.16
ROUTE 14
SOUCY LN
SUNNYSIDE LN
BROCKWAY HILL RD
ZAMPIERI DR
County/Town Line
Road
Stream
Valley Wall
Hydric Soils
Reach Break
Segment Break
Bridge
Stormwater Input
Avulsion
Braiding
Migration
Steep Riffle
Mass Failure
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
Berm RB
0
330
660
1,320
1,980
2,640
Feet

Figure 39: Stevens Branch reach M1.15. Note extensive floodplain of hydric soils.

Figure 40: Stevens Branch segmentM1.15A shows active signs of widening, aggradation and planform change.

M1.15B begins just before the Brockway Road bridge and ends just upstream of a tributary entering on the east side, just downstream of a private bridge crossing on the mainstem. The valley shape for this segment is considerably narrower than for M1.15A. M1.15B is heavily encroached upon on the right side. Flooding occurred here in 2007 when the river overflowed its banks, crossed the road and flooded the commercial garage property on the south side of Brockway Road (pers. comm., Sept. 2008). Although there is some floodplain accessible on the left bank, the road elevation on the right bank is only infinitesimally higher than the left bank flood plain. A berm that is located along the left bank at the top of the segment might force high flows toward the right bank rather than allowing access to the left bank floodplain. The stream in the 2007 flooding location appears to have been cleaned out and freshly riprapped on the right bank (Fig 40). Key features include:

- Dominant buffer on the RB is 0-25 ft, with more than 50% of the segment length having a buffer <25ft.
- The entire length of this segment has been straightened.
- Encroachment and development extend the length of the reach.
- There is 225ft of berm along the left bank at the upstream end of the segment.
- Bank armoring exceeds 20% of the segment length on the right bank.
- There is a major meander curve just upstream of the Brockway Road bridge, which in high flows can back up and overflow the road into a commercial garage area (as it did in 2007).
- The stream is in stage III. Incision appears historic. Where riprap is not arresting change, the stream is showing signs of widening and aggradation (Fig 40).

- Tributary inputs of sediment appear to be fairly major. The 2007 flash flooding also affected the tributary that enters at the top of the segment.
- Substrate is gravel and sensitivity rating is Very High

Figure 41: Stevens Branch mainstem segment M1.15B. This reach flooded in 2007, jumping the road and flowing into a commercial garage property (left). Possibly this same flooding event deposited large amounts of sediment upstream of a sharp meander curve at Brockway Road bridge (right).

Table 17.Stevens Branch Segment M1.15 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.15A M1.15B (1)	Protect river corridor	High High	High High	N	Valuable attenuation asset upstream of important urban center and infrastructure.
M1.15A (2)	Plant stream buffer	Mod erate	Mod erate	Y	Primarily low cost: very high to extreme sensitivity, extensive bank erosion. Agricultural fields on left bank lack buffer in upper segment
M1.15B (5)	Remove berm	High	Mod erate	Y	Potential easy solution to flooding danger in this difficult location. Berm does not appear to protect critical private resources.

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.15B (6)	Replace Existing Bridge Structures	Moderate	Moderate	Y	When bridge is due to be replaced consider structure that allows for more lateral movement of the stream.

6.1.6 Reach M1.16- Stevens Branch mainstem from just downstream of private bridge (upstream of tributary confluence in the vicinity of Zampieri Drive), extending to upstream of the bridge on Circle Street (roughly west of the midpoint between Vesper Road and Short Street off of Brockway Road

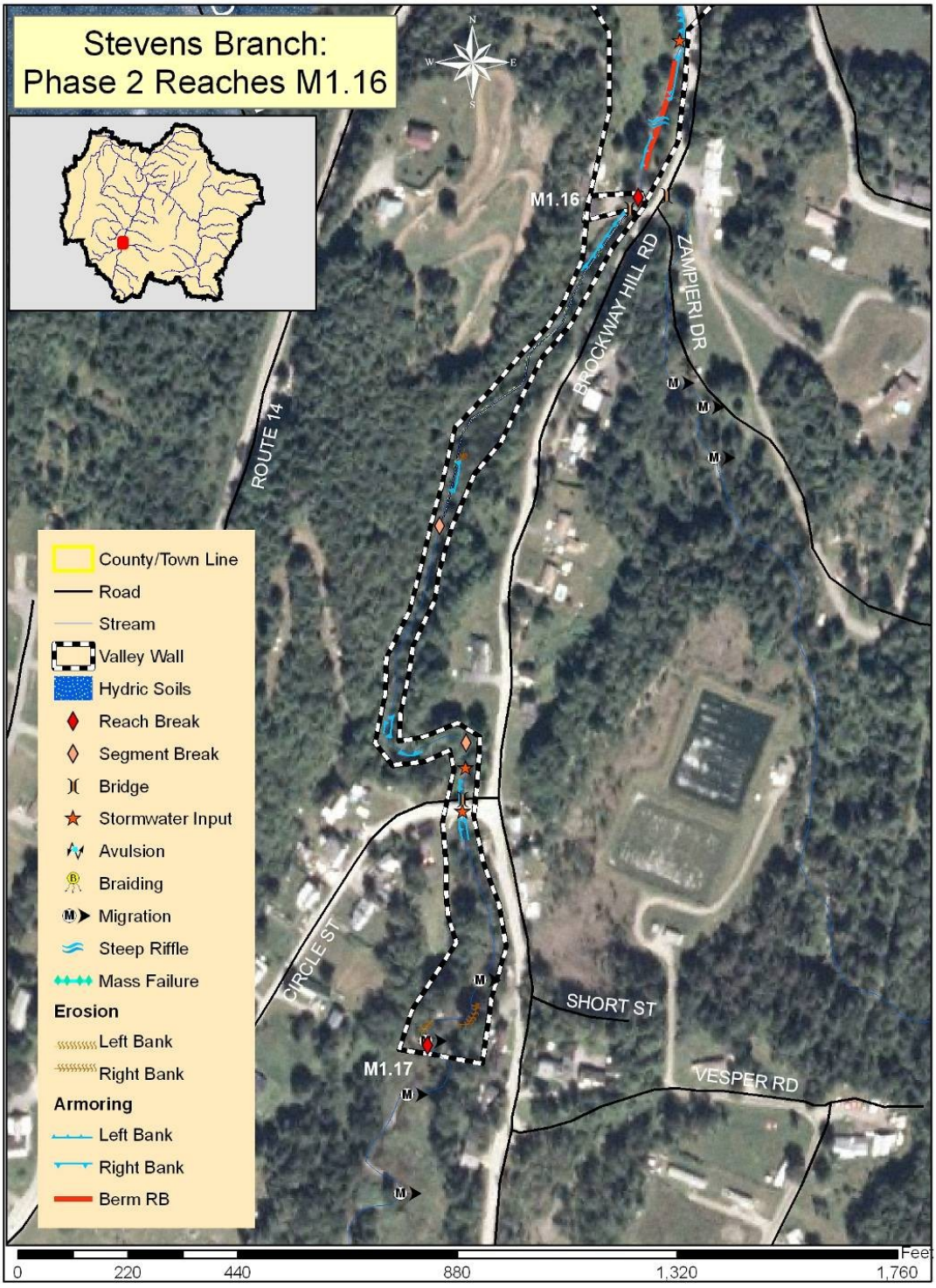

Figure 42: Stevens Branch mainstem reach M1.16.

Reach M1.16 is 2108 feet long and has three segments of 794ft, 622ft and 692ft (Fig 41). This reach is distinctly different from the other reaches assessed in 2008 on the Stevens Branch mainstem. Classified during the Phase I process as a B type stream with a cobble bed and step-pool bedform, the reach was field assessed as several stream types and

includes a bedrock cascade that provides close to 50 feet of elevation gain just in itself. This feature effectively separates the "lower" valley, which comprises the majority of the 2008 study area, and the next valley upstream that stretches further into Williamstown.

M1.16A extends 794 ft from just upstream of the tributary confluence near Zampieri Drive, continuing upstream to the beginning of bedrock grade controls. This segment fits a B-type stream classification with a boulder substrate. The valley has been somewhat narrowed by encroachment on both sides, but otherwise is in reference condition and stable. Key features for this segment include:

- Encroachment has affected >50% of the segment's length on the right bank.
- Road encroachment appears to coincide with the natural valley wall along the right bank.
- The segment is in stage I; reference condition.
- There is a bridge that creates a channel and floodplain constriction.
- The stream substrate is boulder and sensitivity rating is Very Low.

Figure 43: Stevens Branch mainstream segment M1.16A has two old mill site abutments (left) and a coarse, stable substrate (right). Beginning of bedrock grade controls (segment M1.16B) can be seen in the distance of figure at right.

M1.16B is 622 ft long and extends from the beginning to the end of the bedrock-controlled section of this reach. This segment was not assessed fully (no Rapid Geomorphic Assessment scoring) for this project, per Phase 2 Protocols (VT ANR 2007b), because it was determined to be a bedrock gorge. Several old mill sites occur on this stretch of river (Fig 43). This section of stream fits an A-type stream classification, being considerably steeper and more confined than both segments M1.16A and M1.16C.

Figure 44: Stevens Branch mainstem segment M1.16B has several series of grade controls and old mill site abutments.

M1.16C extends from the top of bedrock series, just downstream of the Circle Street bridge crossing, to the top of the reach which is roughly west of the midpoint between Short Street and Vesper Road (off of Brockway Hill Road). This segment returns to a B-type stream classification. There is a high terrace along the left bank in the lower part of M1.16C. This may be imported fill, but it has been there long enough that it is hard to be sure. If it is fill, the valley has been narrowed here and the stream would have been less confined originally. Some key features for this segment include:

- Encroachment and development have affected >50% (right bank) and >30% (left bank) of the segment's length, respectively.
- M1.16C has been straightened for >50% of its length.
- The left bank has been riprapped for about 20% of its length.
- Road encroachment appears to coincide with the natural valley wall along the right bank.
- The segment is in stage II, with incision being the dominant process.
- There is a bridge that creates a channel and floodplain constriction.
- The stream substrate is sand and sensitivity rating is Very High.

Table 18.Stevens Branch Segment M1.16 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers)

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
M1.16A M1.16C (1)	Protect river corridor	Low Moderate	Low Low	N	Narrow corridor is unlikely to get more encroached upon, but it would be best to protect it just in case.
M1.16A M1.16C (6)	Replace Existing Bridge Structures	Moderate	Moderate	Y	When bridges are due to be replaced consider structures that allow for more lateral movement of the stream.

6.1.7 Reach T3.01 - Jail Branch from just the confluence of the Jail Branch and Stevens Branch mainstem, to just upstream of the Ayers Road bridge.

Jail Branch reach T3.01 is 3,474 feet (0.66 miles) long and was assessed as two segments of 902 ft and 2,572 feet (Fig 44). This reach is located in the center of Barre City and is unique in the amount of development and encroachment it has experienced. The topography indicates this area is likely an alluvial fan. Due to extensive development it is difficult to know for sure, and it was not classified as such. The reach has a broad valley naturally, but filling of the valley floodplain (for development) has severely impacted the stream's ability to make use of its valley. Phase 1 assessment classified this reach as a C riffle pool stream with a gravel bed. T3.01B retained this classification in the Phase 2 assessment. T3.01A, however, is significantly entrenched by the addition of fill to the floodplain and has experienced a stream type departure of C riffle pool to F-type planebed. City Road Engineer Reginald Abare (pers. comm., Aug. 2008) suggested that he may request permission in the future to remove sediments from the bed of this stream, particularly in segment T3.01A; the intention would be to facilitate the movement of sediments through town to downstream reaches on the Stevens Branch, with hopes of reducing flood risks in this part of town and preventing stormwater outfalls and bridges in the segment from becoming clogged with sediments. Currently only one side of the arch bridge at South Main St. conducts water at anything less than high flows; the other side is plugged by sediment and coarse woody debris (Fig. 45).

Figure 45: Jail Branch reach T3.01 in Barre City.

Jail Branch segment T3.01A extends from the confluence of the Jail Branch and the Stevens Branch mainstem to just upstream of the railroad bridge north of South Main St. It is in the most heavily developed part of the 2008 study area and is extremely sensitive to upstream processes. Key features include:

- Dominant buffer on both banks is 0-25 ft, with more than 50% of the segment length having a buffer <25ft (both sides).
- The entire segment has been straightened.
- Development and Encroachment are 100% on both banks.
- There is >20% erosion on the right bank.
- Armoring is present for more than 50% of the segment on both banks.
- There is only one stormwater inputs mapped for the reach but surface water runoff can enter the stream in so many locations it was not mappable.
- The stream is in stage II, with incision dominant, and any widening process is arrested by armoring.
- Substrate is gravel and sensitivity rating is Extreme.

Figure 46: Jail Branch segment T3.01A has high levels of encroachment and development. Note the proximity of the warehouse building at right in the photo looking upstream (left). Bridges are trapping sediment and debris (right).

Segment T3.01B includes the 2,572 ft of stream from just upstream of the railroad bridge to just upstream of the Ayers Road bridge. It is also in a heavily developed part of they 2008 study area but has had less fill added to it's floodplain; the right bank is flanked for much of its length by the Spaulding High school playing fields. Like T3.01A, it is extremely sensitive to upstream processes. Key features include:

- Dominant buffer on both banks is 0-25 ft, with more than 50% of the segment length having a buffer <25ft (both sides).
- More than 75% of the segment has been straightened.
- Development is >75% of the segment length on both banks.

- Road encroachment is > 50% of the segment length on both banks.
- There is a 212 ft long berm on the right bank by the playing fields.
- Bank armoring is present on more than 50% of the left bank and >20% of the right bank.
- There were 8 stormwater inputs mapped for the reach.
- There is a large mass failure at the top of the reach on the right bank that poses a significant threat to a house above it (Fig. 46).
- The stream is in stage II, with incision dominant, and widening processes are generally arrested by bank armoring.
- Substrate is gravel and sensitivity rating is Very High.

Figure 47: Jail Branch segment T3.01B has a significant mass failure on the right bank that poses an immediate threat to the house above (this landowner contacted the project partners to alert them to his plight).

Table 19.Stevens Branch Segment T3.01 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.01A T3.01B	Protect river corridor	High High	High High	N	Any changes in development in this valley need to be subject to review relative to its

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
(1)					impact on the stream.
T3.01B (2)	Plant stream buffer	Moderate	Moderate	Y	Primarily low cost: very high to extreme sensitivity, some bank erosion on RB. More buffer should be encouraged along the high school playing fields.
T3.01B (3)	Stabilize stream bank	High	High	Y	There is immediate threat to a property at the top of this segment, RB.
T3.01B (5)	Remove berm	Low	Low	Y	Assess the potential for benefits and problems associated with removing the berm by the playing fields.
T3.01A (6)	Replace Existing Bridge Structure	High	High	Y	When Main Street bridge is due to be replaced consider structure that does not have a central pier that can trap debris and sediment.

6.1.8 Reach T3.02 - Jail Branch from just upstream of the Ayers Road bridge to just upstream of the confluence with Honey Brook

Reach T3.02 of the Jail Branch is 7,624 feet (1.44 miles) long and was assessed as two segments of 1,177 feet and 6,447feet (Fig 47). The reach climbs up out of the Barre City valley over the dramatic 50 foot Spaulding Falls, and levels out again in a linear semi-confined valley. The Phase 1 assessment classified this reach as a B riffle pool stream with a cobble bed. The Phase 2 field assessment found the lower and shorter portion of the reach to be a reference F step pool stream. The upper reach retained its Phase 1 classification, but with a modified "c"(<2 pct.) subslope, since most of the elevation gain for this reach occurs in the first 1,000 ft of length.

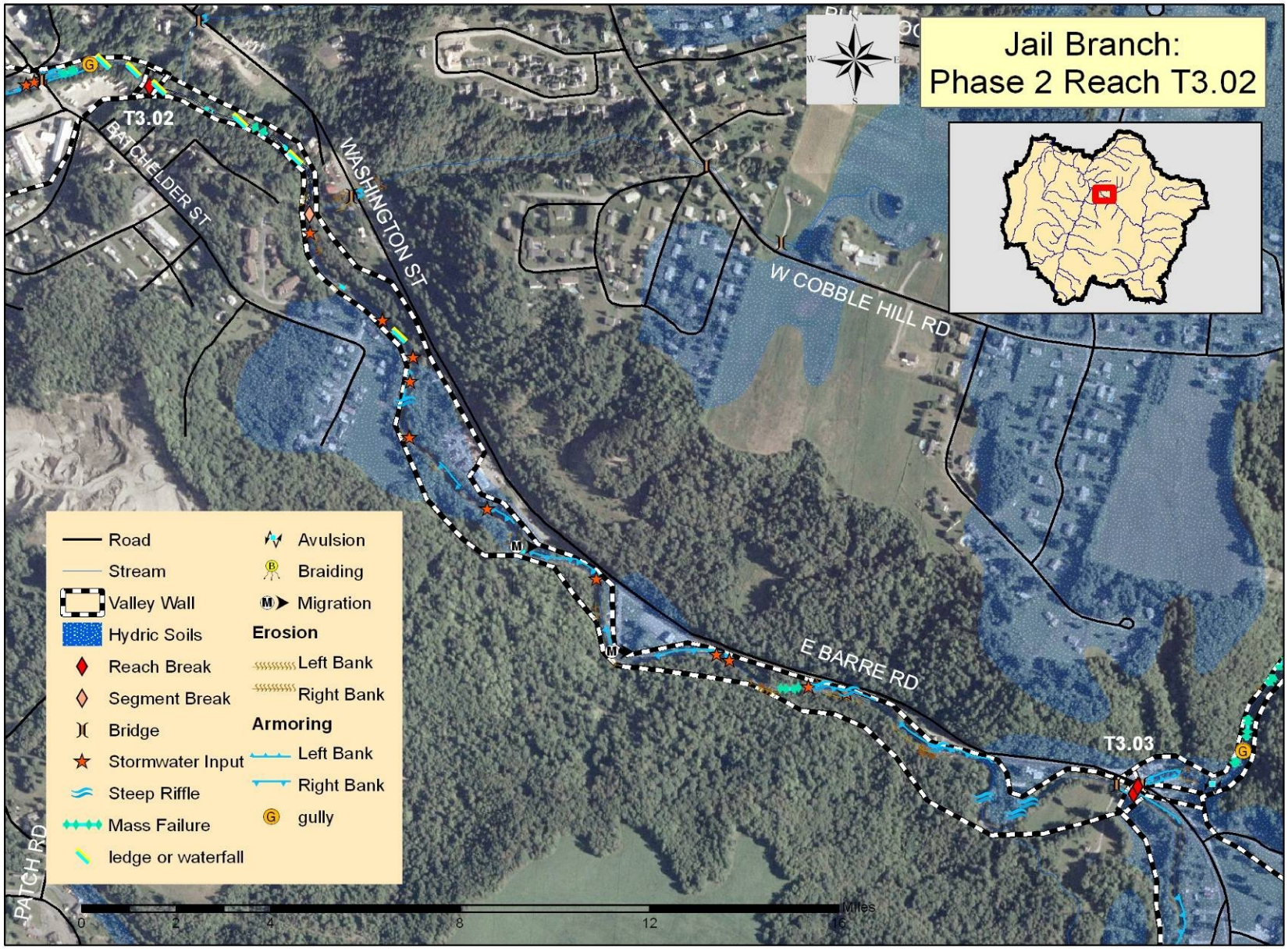

Figure 48: Jail Branch reach T3.02

Segment T302A is somewhat variable in form, starting out with a fairly broad channel and a <4% slope, then transitioning to a very dramatic series of waterfalls with a much greater slope. The lower portion, where a cross-section was taken, indicated an F-type stream. The short length of the falls itself would an A-type stream, due to the higher slope, but was not segmented out. The grade control series, although the most memorable part of the segment, was only about 30% of the segment length. Features of note include:

- Bedrock grade controls, combined, measured approximately 80-100 feet in height (the upper one was estimated, not measured).
- Large mass failures are common on both banks where bedrock is not present.
- Road encroachment is found on >20% of the segment, both sides.
- Development is found on 30-50% of the segment, both sides.
- Valley walls are extremely steep and development is often found very close to the slope break at the top.
- This segment is in stage IIc of a D evolution model. The D model was used because of the bedrock substrate which causes widening to occur without incision. Widening and some aggradation are occurring.
- Substrate is cobble and sensitivity is Extreme. This rating refers to the lower slope areas where the cross-section was taken, not the falls area where the valley is bedrock-controlled.

Figure 49: Jail Branch segment T3.02A has both a steep narrow valley with waterfalls (left) and a wide channel with bedrock in the bed and steep valley walls (right).

Segment T3.02B is a narrow to semi-confined valley with <2% slope. It is heavily encroached upon along the right bank with its valley wall being adjoining elevated road bed or development. Soil maps show hydric soils in several areas along this valley; many of these areas are filled and developed. Areas of potential attenuation in this reach and upstream, significantly diminished already, are critical given the extremely sensitive nature of the lowest reach on the Jail Branch. Features of note include:

- Significant erosion and one mass failure along the left bank; this comprises only 5-10% of the overall segment, but measures close to 1,000 feet in length.
- Road encroachment is found on >65% of the segment on the right bank.
- Development is found on >30% of the segment on the right bank.
- Valley walls are extremely steep and appear unstable.
- Bank armoring is found on >30% of the right bank.
- There are 11 stormwater inputs to this segment.
- Segment T3.02B is in stage IV of an F evolution model. Historic incision has led to widening and aggradation. Aggradation is still occurring and new flood terraces are developing as the stream tries to stabilize.
- Substrate is cobble and sensitivity rating is High

Figure 50: Jail Branch segment T3.02B: Large aggradational bars are creating new flood plain (top left); left bank valley wall shows signs of instability (top right); right bank development is common and often includes dumping in the stream channel (lower left); right bank road encroachment and riprapping is frequent (lower right).

Table 20.Stevens Branch Segment T3.02 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.02A T3.02B (1)	Protect river corridor	Low High	Low High	N	Any area of attenuation upstream of Barre City is an extremely valuable asset to protect. T3.02A has little to no value as an attenuation asset.
T3.02B (2)	Plant stream buffer	Low	Low	Y	Primarily low cost: very high to extreme sensitivity. Bank lacks buffer at top of T3.02B.

6.1.9 Reach T3.03 - Jail Branch from just upstream of the confluence with Honey Brook to tributary confluence (from the south) just upstream of beginning of huge mass failures along the north valley wall

Reach T3.03 is 5,507 feet (1.04 miles) long and was assessed as two segments of 4,743 ft and 764 ft. (Fig 50). This reach stretches out along a long broad valley. The East Barre Road (Rte. 302) has narrowed the natural valley width somewhat. Development and encroachment are present along both sides. Soil maps show a great deal of hydric soils in this valley. Some of these areas have been developed, but not all. The Phase 1 process classified this reach as a C riffle-pool stream with a cobble bed. Both segments retained the C-type classification in the Phase 2 assessment, but the upper short segment was found on steeper slopes (subslope “b”, 2-4 percent slope) and has a step-pool bed type.

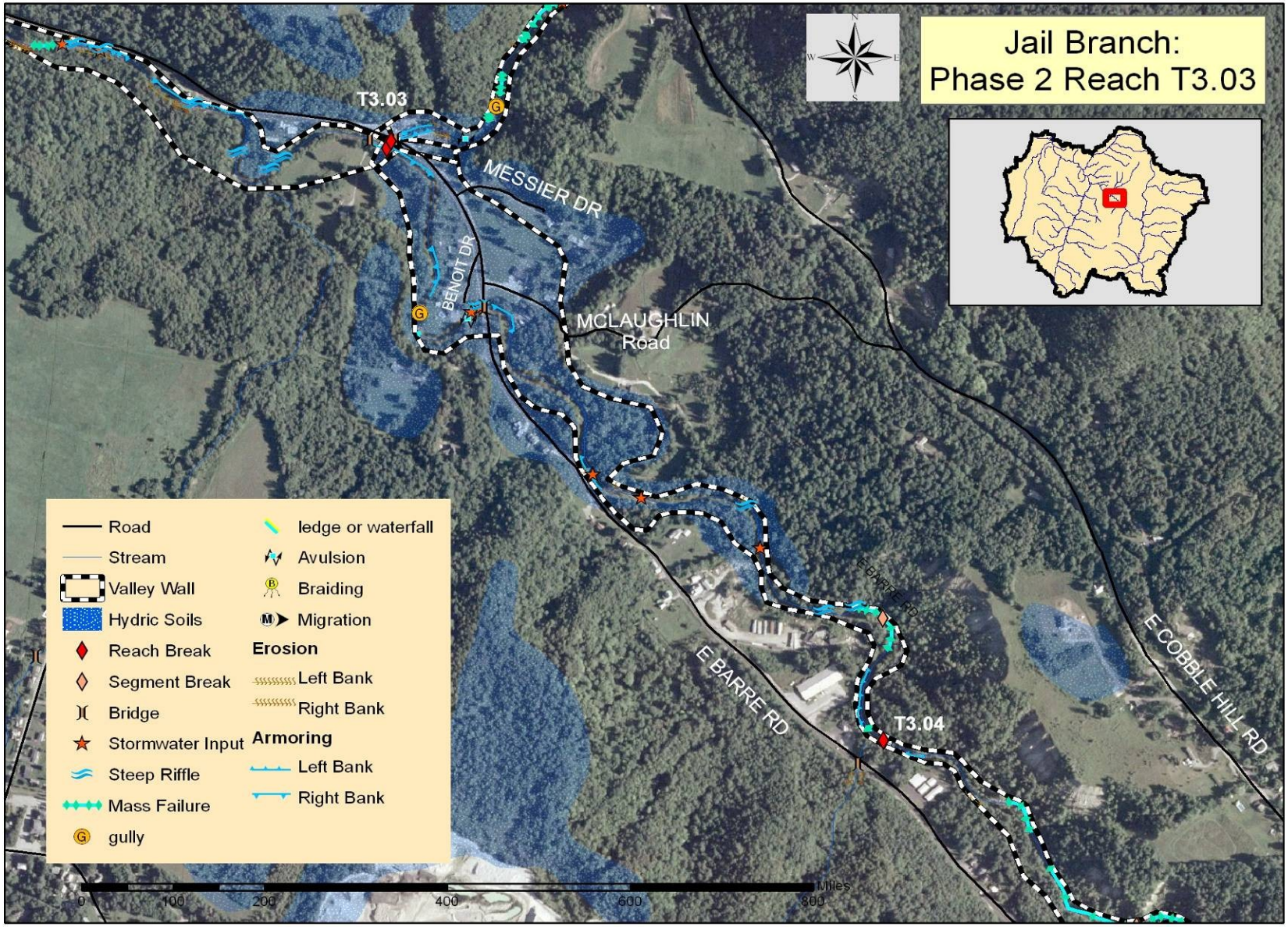

Figure 51: Jail Branch reach T3.03.

Segment T3.03A comprises most of the length of this reach. This valley is variable in width but has areas of potential attenuation that should be given priority for protection. Some of the areas with wider floodplain and hydric soils have been developed, but some areas remain. Any areas of potential attenuation in this reach and upstream are critical given the sensitive nature of the lowest reach on the Jail. Features of note include:

- Development is found on >50% of the segment, on alternating stream banks
- Road encroachment is found on >65% of the segment, on alternating stream banks
- Valley walls are very steep and where they are close to the stream, are seemingly unstable.
- Bank armoring is found on 10-20% of the right bank.
- There are 5 stormwater inputs to this segment, all of them road ditches.
- There is a major bridge between two large meander curves. The potential for surges and consequent flooding upstream of the bridge are considerable. This is the site of a past bridge washout on Route 302 and the bridge was rebuilt.
- This segment is in stage IV of an F evolution model. Historic incision has led to widening and aggradation. Aggradation is still occurring and new flood terraces are developing as the stream begins to stabilize.
- Substrate is cobble and sensitivity rating is High.

Figure 52: Jail Branch segment T3.03A: steep valley walls are frequently unstable (top left); site of old route 302 that washed out in 1927 flooding (top right), areas of accessible flood plain are intermittent (lower left); road encroachment and riprapping are common (lower right).

Segment T3.03B is a relatively short section of stream but is notable on several levels. This segment begins the portion of the Jail Branch that is distinguished by enormous mass failures on the north side of the stream, which are close to 200ft in height. It is also the beginning of coarser substrates and increased channel slopes. Development and fill along the left bank has forced the stream toward the right bank slope (which is extremely steep and unstable). Features of note include:

- Development is found on >20% of the segment on the left bank.
- Bank armoring is found on >20% of the left bank.
- Valley walls are extremely steep and where they are close to the stream appear quite unstable.
- Enormous mass failures feed sediments into the base of this segment.
- This segment is in stage II of an F evolution model. Incision is the primary process here. Planform change is also occurring as the stream reacts to encroachment on the left bank and unstable slopes on the right bank.
- Substrate is cobble (but almost boulder) and sensitivity rating is High.

Figure 53: Jail Branch segment T3.03B: enormous mass failures on the right valley edge have the potential to continue supplying significant amounts of sediment to the stream. Development on elevated fill along the left bank forces the stream towards these mass failures. This segment has a steeper slope than segment T3.03A and includes more boulders in the substrate.

Table 21.Stevens Branch Segment T3.03 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.03A T3.03B (1)	Protect river corridor	High High	High High	N	Any area of attenuation upstream Barre City is an extremely valuable asset to protect. Segment B has little to no value as an attenuation asset but rock dumping into the stream is causing problems and should be monitored.
T3.03A (2)	Plant stream buffer	Low	Low	Y	Primarily low cost: very high to extreme sensitivity. There is some unbuffered bank at the bottom of segment A.
T3.03A (4)	Arrest head cut	High	High	Y	There is a gully forming lower in the reach; investigate source and evaluate potential for arresting headcutting there.

6.1.10 Reach T3.04 - Jail Branch from tributary confluence (from the south), just upstream of beginning of huge mass failures along the north valley wall, to just downstream of the old dam near Rte. 110 (Washington Rd.) in East Barre.

Reach T3.04 is 5,099 feet (0.97 miles) long and was assessed as four segments of 1,828 ft, 1,111ft, 1,341ft , and 819 ft in length. This reach is characterized by a semi-confined valley that has a considerable amount of development and industry in it. Enormous mass failures stretch along the north side valley wall along the lower half of the reach. The Phase 1 process classified this stream as a B step-pool stream with a boulder bed. Only segment T3.04A retained this classification in the Phase 2 assessment. Segments T3.04B and T3.04D have been so encroached upon that the stream is entrenched by artificial fill, leading to a stream type departure from B to F. Segment T3.04 C has a naturally broader valley and was re-classified as a C-type sub-reach. In reach T3.04D the natural valley has

been narrowed in places by East Barre Road/Route 302 on the north side and old route 302 on the south side.

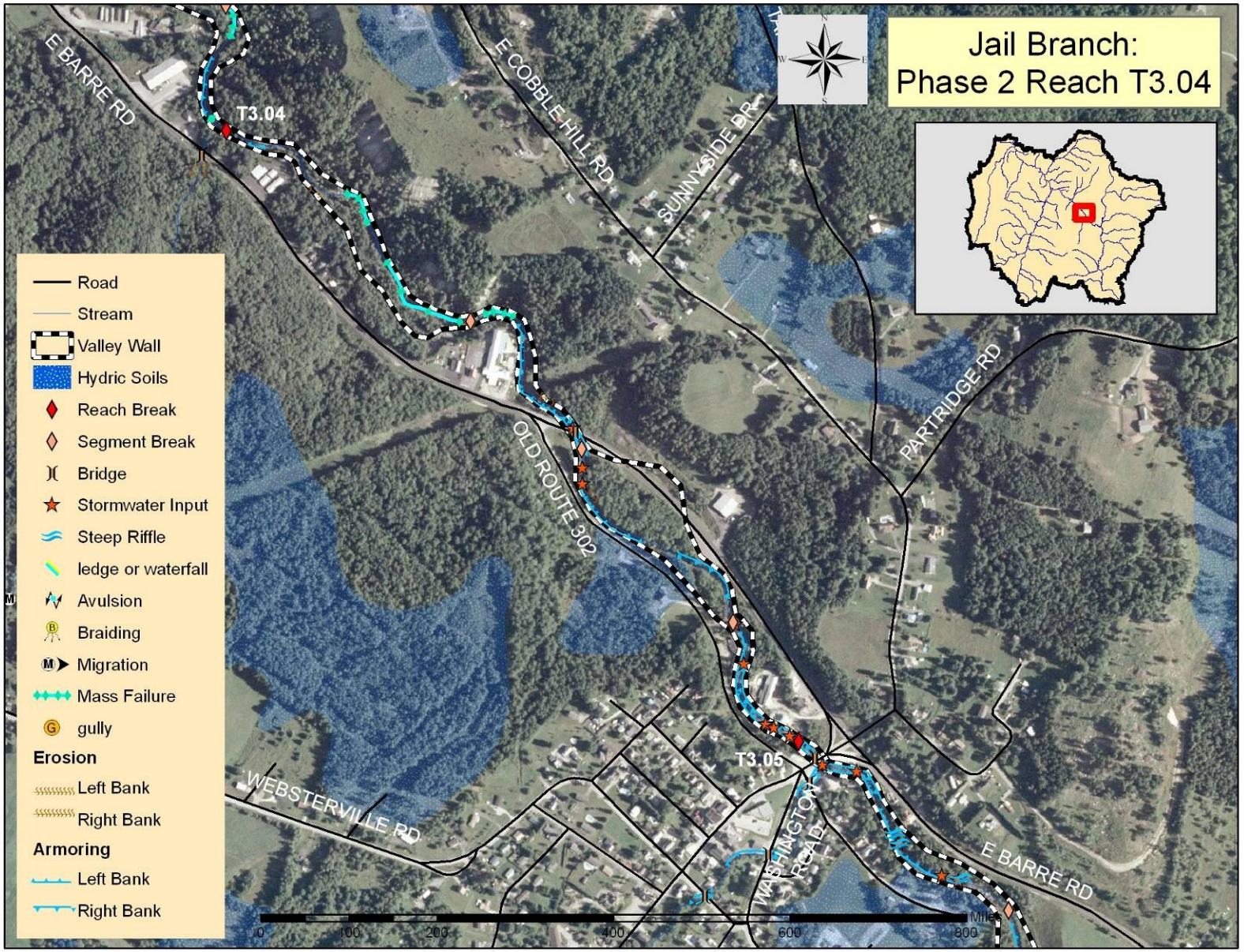

Figure 54: Jail Branch reach T3.04.

Segment T3.04A (1,828 ft long) has a fairly natural valley with a small amount of flood plain available to it. There has been some filling of the left side of the valley with what looks like waste granite blocks, but the fill is at a distance from the stream edge. Some key features include:

- Development extends along approximately 30% of the left side.
- Mass failures extend the entire length of the segment along the right side of the valley. In some cases it is far enough back from the stream to not have been mapped, but it is never far enough back that significant sediment inputs would fail to reach the stream when there are further mass failures.
- Other than some filling of the valley edges, this segment has not been heavily manipulated.
- This segment is in stage IIc of a D evolution model. The boulder bed provides a resistant bed so that the segment shows no real signs of incision but instead exhibits other signs of adjustment: widening, aggradation, and planform change.
- The substrate is boulder and the sensitivity rating is Very Low.

Segment T3.04B (1,111 feet long) is heavily encroached upon. Development crowds the left bank and an extremely steep valley wall crowds the right bank. Artificial narrowing of the valley with fill has caused a stream type departure of B to F. Key features include:

- Road encroachment is found along approximately 50% of the segment.
- Development is found along >50% of the segment.
- Armoring is found on >75% of the left bank and >20% of the right bank.
- A very large mass failure is located at the base of this segment at a large meander bend. This mass failure shows a significant amount of recent sliding and slumping.
- In addition to the mass failure, the right valley wall shows other frequent signs of instability.
- Fill added to the left bank has significantly narrowed the stream channel in one section of the segment.
- The bridge at the top of the segment has significant deposition associated with it.
- The segment is in stage IIc of a D evolution model. The boulder bed provides a resistant bed so that the segment shows no real signs of incision but is exhibiting other signs of adjustment: widening, aggradation, and planform change.
- The substrate is boulder and the sensitivity rating is Very Low.

Figure 55: Jail Branch reach T3.04 segment B has had considerable fill added to the left bank (left). The mass failure at the base of the segment shows recent erosion activity (upper right). The combination of development encroachment and steep unstable valley walls is a problematic one for the Jail Branch (lower right).

Segment T3.04C (1,341 ft long) is located in a stretch of the reach that has a naturally broader valley and gentler slope. The roads on both sides narrow the valley somewhat, but the valley is still wide enough to be classified as broad, rather than semi-confined, and for the segment to have a C rather than a B type stream classification. Key features include:

- The dominant LB buffer and the subdominant RB buffer are 0-25 ft, with a total of 750+ ft of buffer < 25 ft. The lack of a buffer is associated with roads.
- Encroachment extends along >50% of both banks.
- Armoring is present along >30% of both banks.
- The entire segment appears to have been straightened.
- There are two stormwater inputs to this segment.
- The stream is in stage II of an F evolution model. Although the bed is somewhat resistant, there is still some sign of active incision.
- Bed substrate is boulder, sensitivity is Very Low, and geomorphic condition is Good.

Segment T3.04D (819 feet long) is also heavily encroached upon. Slope is similar to segment T3.04C (2-4 pct). The artificial narrowing of the valley with fill has caused a stream type departure of B to F. Key features include:

- Dominant buffer along both banks is 0-25 ft. The lack of a buffer is associated with roads.
- Road encroachment is found along >30% of both banks.
- Development is found along >50% of one bank.
- Armoring is found on almost 100% of both banks.
- There are 4 stormwater inputs to this segment.
- Fill added to the left bank has narrowed the natural valley considerably.
- The segment is in stage II of an F evolution model. Extensive riprap and fill has arrested and to some extent masked processes. Incision has occurred historically and is thought to still be occurring, and widening and aggradation are minimal.
- The substrate is boulder and the sensitivity rating is Very Low.

Figure 56: Jail Branch segment T3.04D. Fill added to the right bank has severely narrowed the natural valley (left).

Table 22.Stevens Branch Segment T3.04 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Water-shed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.04A T3.04B T3.04C T3.04D (1)	Protect river corridor	High High Low Low	High High Low Low	N	Segments A and C have some attenuation assets. Sediment inputs to segment A more likely of consequence. Management on Segments B can affect the stream relationship with its right valley wall and should be monitored.

6.1.11 Reach T3.05 - Jail Branch from the old dam near Washington Road in East Barre to the flood control Dam approximately 0.5 miles upstream.

Reach T3.05 is 2,880 feet (0.55 miles) long and was assessed as two segments of 1,515 and 1,365 feet. This reach comprises the upstream limit of the 2008-09 Phase 2 study area and is characterized by having a semi- to narrowly confined valley with a considerable amount of development in it (Fig. 56). The lower portion is mostly impacted by residential development, and the upper portion by the construction of a major flood control dam. The phase 1 process called this a broad valley containing a B step-pool stream with a boulder substrate The phase 2 assessment found that, due to human encroachment and development, this reach no longer has a broad valley, but instead is semi to narrowly confined. Segment B has been manipulated enough to change the bedform to planebed.

Segment T3.05A has been encroached upon by development has a narrowly-confined valley due to extensive filling of the valley. Key features include:

- The subdominant buffer on both sides is 0-25 ft. The lack of a buffer is associated with roads.
- Encroachment extends along >50% of one bank.
- Armoring is present along >30% of the right bank and >60% of the left bank.
- More than 75% of the segment appears to have been straightened.
- There are three stormwater inputs to the segment.
- There is an old mill dam (grade control) and a bridge in this segment. Both provide channel constrictions and have deposition and scour as impacts.
- The stream is in stage II of an F evolution model. Historical and recent incision are beginning to lead to widening and planform adjustment. Stage II-III might be a more accurate description of the process occurring here.
- Bed substrate is boulder, sensitivity is Very Low, and geomorphic condition is Fair.

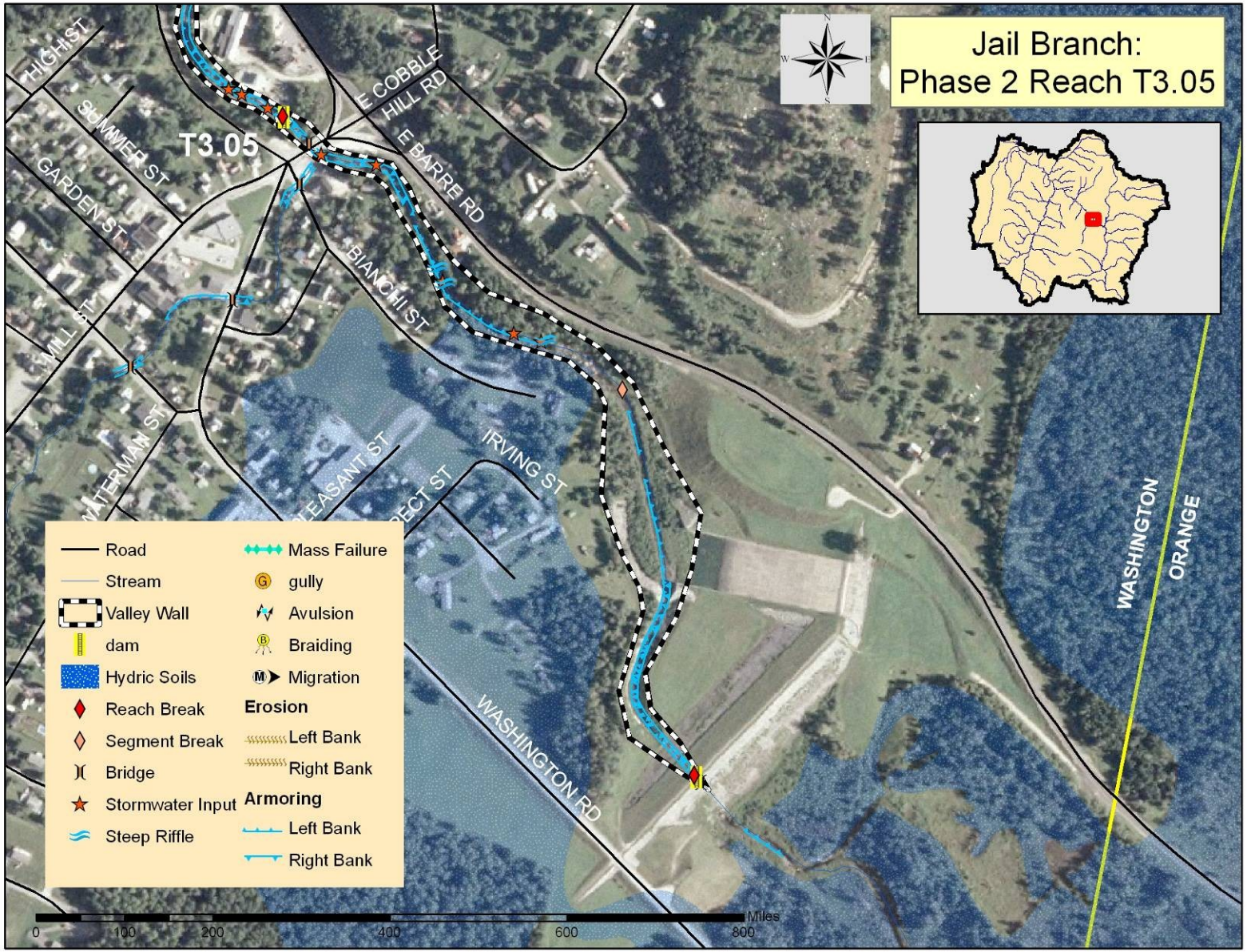

Figure 57: Jail Branch reach T3.05.

Figure 58: Jail Branch reach T3.05 segment A has been impacted by fill and development in the natural stream valley (left). An old mill site downstream of the Washington Road is still functioning as a grade control and channel constriction.

Segment T3.05B has been heavily influenced by the building and maintenance of the flood control dam at the top of the segment. Key features include:

- The dominant buffer on both banks is 0-25 ft.
- Development for the dam extends along 75% of both banks.
- Armoring is present along >60% of the left bank and >50% of the right bank.
- The entire segment has been straightened.
- The stream is in stage I of an F evolution model. Extensive bank and bed stabilization with boulder paving, cut cobbles (on both banks and bed), constructed floodplain, and some natural flood plain all keep this segment of stream in stable condition..
- Bed substrate is cobble, sensitivity is High, and geomorphic condition is Fair. If the cross section pebble count had been taken a little further up the reach where boulder paving began, the substrate would have been boulder and the sensitivity rating Very Low.

Figure 59: Jail Branch reach T3.05 segment B is primarily impacted by the flood control dam. Photos above show extensive bank manipulation and stream straightening.

Table 23.Stevens Branch Segment T3.05 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.05A T3.05B (1)	Protect river corridor	High Low	Low Low	N	The flood control dam restricts sediments from moving into this reach and attenuation is less important this close to the dam. Management activity within segment A could impact erosion and potential damage to infrastructure in East Barre.

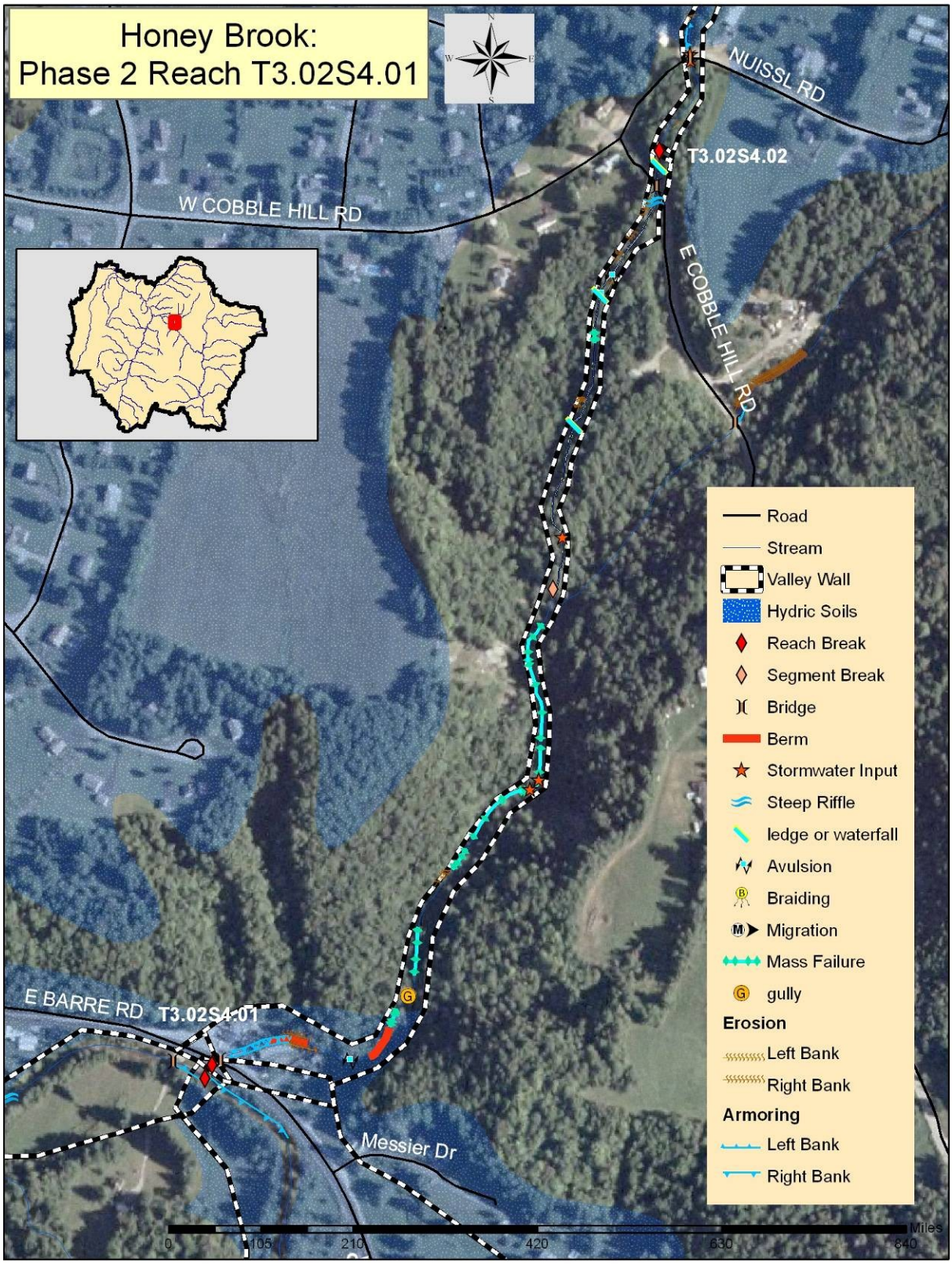

Figure 60: Honey Brook reach T2S4.01

6.1.12 Reach T3.02S4.01- Honey Brook from its confluence with the Jail Branch to just upstream of East Cobble Hill Road.

Reach T3.02S4.01 is 3,233 feet (0.61 miles) long and was assessed as two segments of 1,949 and 1,285 feet in length (Fig. 59). This reach is characterized by a relatively narrow valley, with a lower portion that is subject to mass failures and an upper portion that has grade controls that stabilize the bed and some portions of the banks. The phase 1 process classified this reach as an A step-pool stream. The phase 2 assessment found the lower segment to have a semi-confined valley and classified it as a B step-pool subreach. The upper segment has widened to the extent that the phase 2 assessment classified it as an F step-pool stream with a gravel bed.

Segment T3.02S4.01A was impacted by flash flooding in 2007 and 2008. Recent mass failures and large gullies dominate the valley walls, and a large number of trees slid off the valley walls and will eventually be falling into the stream (Fig. 60). The development, bridge abutments and associated bank armoring at the base of the segment received significant flood damage. Two landowners were bought out after the flooding in 2008 repeated much of the damage incurred in 2007, and the buildings on these properties were removed during fall 2008. The old Dugout Restaurant property was purchased after the floods, and the new landowner has plans for renovation.

Key features on segment T3.02S4.01A include:

- Subdominant buffers on both sides are 1-25 ft. The lack of buffer is concentrated at the lower end of the segment.
- Development is common at the very base of the segment.
- There is a channel constriction at the bridge on the E. Barre Road.
- There are two stormwater inputs to the segment, including a substantial input from the Crescent Ln. housing development northwest of the reach along W.Cobble Hill Rd. This stormwater appears to have contributed to gullying and mass failures in a steep valley that enters this segment at the very top of the segment
- Mass failures and erosion are common, and there is a 300 ft long, 30 ft deep gully beneath E. Cobble Hill Rd. off the right bank of the segment.
- Bank armoring occurs on less than 10% of the total segment but is found on both sides at the base of the segment.
- This segment is in stage III of an F evolution model. Planform changes dominate after two flood events triggered mass failures and significant coarse woody debris inputs (which are helping retain sediments in several areas).
- The substrate is cobble, the sensitivity is High, and geomorphic condition is Fair.

Figure 61: Honey Brook segment T3.02S4.01A. A combination of heavy rains, mass failures (top), and a channel constriction (lower left) contributed to extensive flood impacts (lower right) in 2007 and again in 2008.

Segment T3.02S4.01B has a narrowly confined valley and is characterized by periodic bedrock grade controls that stabilize the bed. Widening has occurred to the extent that there has been a stream type departure of an A to F classification. Key features include:

- There is a significantly undersized culvert that completely transverses the channel and floodplain at the top of the segment; cut granite armoring lining the culvert on the downstream end has significantly failed in the last two years of flooding, and the upstream end of the culvert is partially obstructed by sediments.
- There is one stormwater input to the segment.
- There are 3 ledge grade controls. Two are substantial (over 20 ft in height).
- The stream is in stage IIc of a D evolution model. Bedrock provides enough bed resistance that the stream has widened without incising.
- Substrate is gravel, sensitivity rating is Extreme, and geomorphic condition is Fair.

Table 24. Honey Brook Segment T3.02S4.01 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.02S4.01A T3.02S4.01B (1)	Protect river corridor	High High	Moderate Moderate	N	Segment A has development pressure at base of reach. Management activities in segment B may trigger mass failures and should be monitored.
T3.02S4.01A T3.02S4.01B (6)	Replace existing structures	High High	High High		Severe constrictions at all crossings should be replaced. Culvert washouts could impact downstream reaches and local infrastructure.

6.1.13 Reach T3.02S4.02- Honey Brook from just upstream of East Cobble Hill Road to the headwaters, upstream of Osborne Road.

Reach T3.02S4.02 is 6,940 feet (1.31 miles) long and was assessed as two segments of 651 and 6,289 feet in length. This reach is characterized primarily by a very broad valley with a fair amount of agricultural use and linear wetlands in upstream areas (Fig. 61). The phase 1 process classified this reach as a C riffle pool stream with a "b" (2-4 pct.) slope and a gravel bed. The phase 2 assessment retained this classification for the upper segment, changing the substrate to sand. The lower segment has been impacted by deep historic incision to the extent that there has been stream type departure of C to B. Management considerations for this segment will need to consider whether equilibrium conditions can be re-established more effectively by managing toward a B or C type stream, as significant residential development and infrastructure investments that are unlikely to be removed have contributed heavily to this stream type departure.

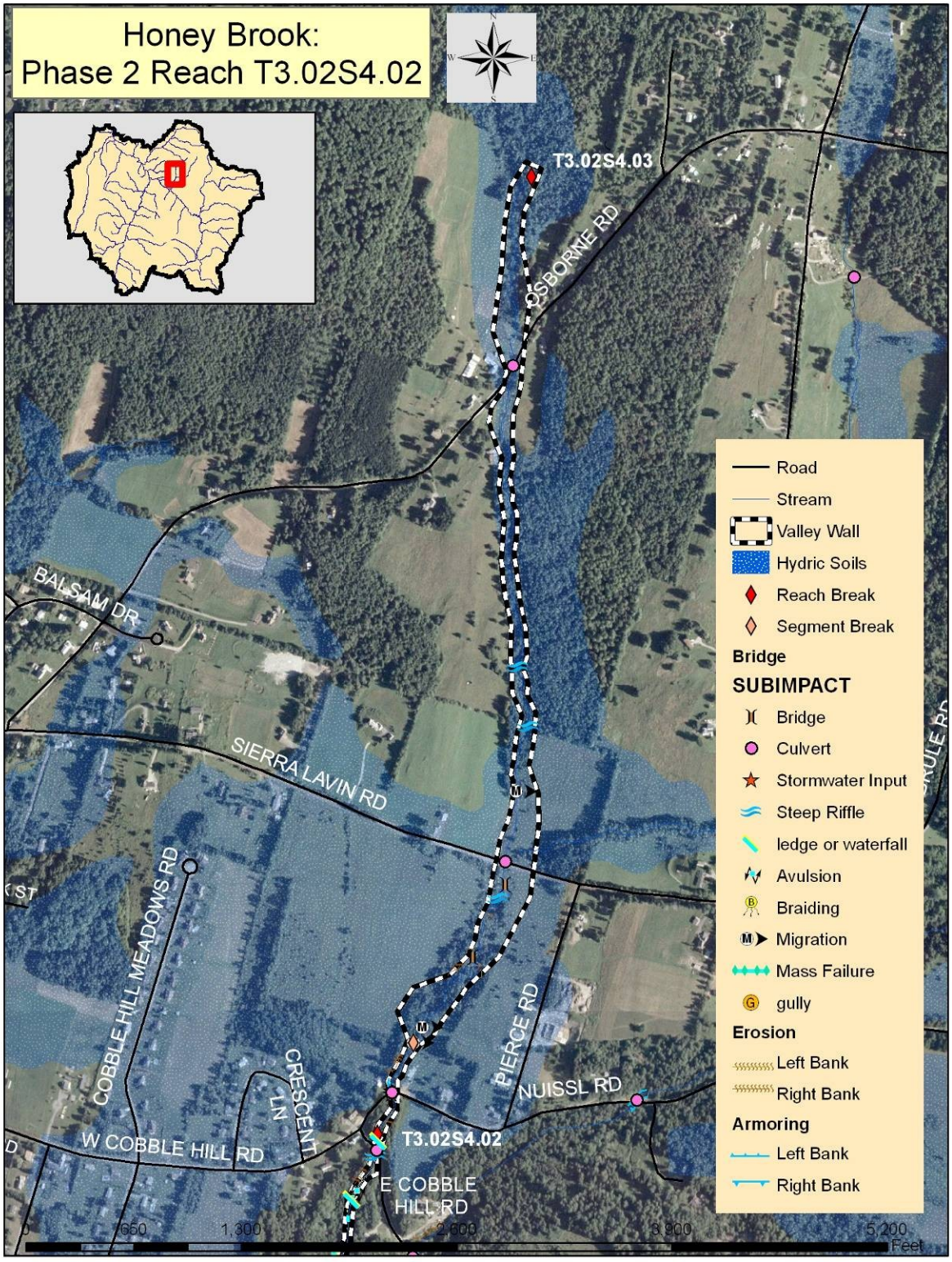

Figure 62: Honey Brook reach T3.02S4.02.

Segment T3.02S4.02A is very short and has been heavily impacted by development, a channelized stream crossing, stormwater inputs, and historic incision that has narrowed the valley width for this segment considerably. Soil maps show the upper part of the segment to be hydric. Development in this same area suggests loss of wetland attenuation assets. Key features include:

- Subdominant buffer on the LB is 0-25 ft.
- Development has impacted >50% of this segment on both sides.
- There are two stormwater inputs to this segment, including a significant urban input perched above the downstream end of the Nuissl Rd. culvert crossing.
- There is undersized (4 foot) culvert that completely transverses the channel and floodplain at Nuissl Road. The culvert is perched on the downstream end.
- The segment is in stage IV of an F evolution model. Historic incision has led to some limited planform adjustments. The stream is mostly stable.
- Substrate is gravel, sensitivity rating is High, and geomorphic condition is Fair.

Segment T3.02S4.02B comprises most of the length of the reach. It is characterized by a very broad valley, and relatively few direct impacts from development and encroachment. Dominant use of the right corridor is pasture. Key features include:

- Buffers are >25 ft for more than 1,200 ft on both sides.
- There are 3 channel constrictions. Two culverts are severe constrictions (4 ft, and 1.4 ft). The stream is channelized at these crossings.
- Agricultural use is common and significant portions were likely ditched for agriculture historically; it was unclear if there are any drain tiles installed.
- The segment is in stage IV of an F evolution model. Minor widening and planform change through aggradation are occurring following historic incision.
- Substrate is sand, sensitivity is very high, and geomorphic condition is Fair.
- Most of the segment is lined by a linear palustrine wetland that appears in the Vermont Significant Wetlands Inventory, saturated during the wettest summer on record at the Montpelier/Barre reporting station (NOAA 2008).

Table 25.Stevens Branch Segment T3.02S4.02 Projects and Practices Table used throughout the stepwise project identification process (VT ANR RCPG, Ch. 6 step numbers).

River Segment (step no.)	Project	Reach Priority	Watershed Priority	Completed Independent of Other Practices	Next Steps and Other Project Notes
T3.02S4.02A T3.02S4.02B (1)	Protect river corridor	High High	Moderate Moderate	N	Segment A has significant attenuation assets. Segment B has human impacts where management could affect downstream segments.
T3.02S4.02A T3.02S4.02B (6)	Replace existing structures	High High	High High		Severe constrictions at all crossings should be replaced. Culvert washouts could impact downstream reaches.

6.2 PROJECT PRIORITIZATION

Reaches selected for inclusion in the Stevens Branch watershed 2008 Phase 2 assessment range from very low sensitivity (upper Jail Branch) to extreme sensitivity (much of the Stevens Branch and parts of the Jail Branch and Honey Brook) to changes in watershed inputs. For reaches with high to extreme sensitivity, passive geomorphic restoration projects, which leverage these inputs and use the river's own energy to facilitate a return to equilibrium conditions, are generally preferred for prioritization due to the likelihood of rapid stream evolution. Lower investments associated with this approach are desirable considering an inherent degree of uncertainty in the success of engineered approaches in an active system, and the Stevens Branch watershed can certainly be characterized as an active system.

Currently, a primary issue in the Stevens watershed is the significant increase in stream power resulting from long-term impacts of extensive straightening and consequent loss of floodplain access. Extensive straightening has encouraged subsequent development and agriculture in many historic floodplains such that key attenuation assets are a rapidly dwindling resource. With continued significant development pressures, high priority is

recommended for protection of these assets as a basis for reducing flood hazards and land-use conflicts.

The use of belt-width corridors, created during the FEH corridor approach being developed by the State of Vermont River Management Program, offers a science-based refinement and added measure of protection over corridors that are based only on a predefined width or similar method (VT ANR, 2007a). The width of this corridor is based on over 30 years of research and data collected from hundreds of streams around the world, and approximates the extent of lateral adjustments likely to occur over time in a meandering stream type (VT ANR 2007 Protocols, Appendix H). "Human investments within the belt width inevitably result in structural constraints placed on the channel adjustment process to protect those investments and address associated threats to public safety. These threats will be largely avoided by recognizing the hazards created by development, incompatible with channel adjustments, within the critical belt width" (VT ANR 2007 Phase 2 Protocols, p.17).

Key attenuation assets available to provide significant amounts of floodplain access in this watershed are found all along the phase 2 area of the Stevens Branch mainstem but only in very limited supply on the Jail Branch and Honey Brook.

Stevens Branch reaches with significant attenuation assets include all Phase 2 reaches except M1.12 and M1.16. Nine of the fifteen segments on the Stevens are listed as having good attenuation assets. Due to the extremely erodible materials present along the banks of the streams in this area, ample buffer establishment will be critical to permitting these functions without continuing to lose large amounts of fine sediments and valuable nutrients.

On the Jail Branch, limited but important attenuation assets are listed for 3 of 12 segments (T3.02B,T3.03A, and T3.04A). Since development and encroachment along Rte. 302 has already impaired the ability of this watershed to attenuate flow and sediments, it is critical to protect the assets that remain.

Honey Brook has one segment on the upper reach that has significant attenuation assets. This segment is fairly extensive and lies upstream of an extremely sensitive section of stream on steeper slopes leading down to the Jail Branch valley (where there is considerable development and infrastructure). Its importance as an attenuation asset is high.

In addition to protecting attenuation assets, efforts to reduce increased direct hydrologic inputs to the stream from stormwater inputs and addressing these issues in development and transportation planning throughout the watershed will help with avoidance and mitigation of flood hazards and will permit stream reaches out of equilibrium to begin to regain a balance between flow and sediment transport. Stormwater management to ensure percolation and distribution over well vegetated surfaces can be combined with maintenance and/or establishment of woody buffers to mitigate surface flow impacts and flood hazards. A total of 80 direct stormwater imputs were mapped during the phase 2 assessment process. Certain reaches had a high proportion, but only seven segments had none.

A primary objective for watershed stability is ensuring sediment continuity so that bed load sediments can work their way through the stream network and contribute to the rebuilding of floodplains and meanders. Deposition of coarse bedload sediments will be vital to the reestablishment of meanders, pools, and a variety of stream features that are currently not well distributed in the watershed. For the Stevens Branch, coarse sediments are largely being recruited from the tributaries. Extremely erodible bank materials of most the mainstem reaches are primarily contributing fine sediments (gravel, sand, and silt) that are commonly being transported large distances downstream (except in instances of reduced flow). This dynamic increases the export of nutrients out of the watershed and contributes to filling of pools and plane bed formation; eliminating the habitat variety needed by fish and the insects and macro invertebrates that form an important part of the food chain critical to the vital fisheries resources of the Stevens and the greater Winooski watershed. On the Jail Branch and Honey Brook, coarse and fine sediments are more evenly distributed and are found both in the stream valleys and in contributing tributaries. Sediment continuity is broken when stream flow or sediment inputs are increased or decreased; straightened reaches, stormwater inputs, bridge and culvert channel restrictions, and destabilized stream banks all contribute to the disruption of a sediment regime in equilibrium.

Sediment regime departure analysis (see Section 5.1.4 of this report, especially Fig. 9) currently indicates significant deposition in several reaches of the Stevens Branch, Jail Branch and Honey Brook. Bridges and culverts have frequently been identified as constrictions restricting sediment transport to reaches farther downstream. Replacement with structures of adequate size to permit transport of both sediment and water in high flows would benefit these dynamics (sizing guidelines and recommendations are currently being developed by a number of cooperating partners, including VT Fish & Wildlife, VT Agency of Transportation, Better Backroads, and other organizations, and are expected to be released in 2008). Replacement projects would benefit from cost/benefit analysis or capital budgeting and prioritization, particularly in situations in which outflanking of structures might be consistent with stream dynamics and cost is prohibitive.

With these considerations as a general backdrop, Table 26 lists potential projects in the Stevens Branch corridor planning Project area in recommended order of priority. Project prioritization should be considered preliminary and will need to be adjusted based on further information and community interest. Buffer establishment and augmentation would be an important component of many of these projects, although planting conditions will be difficult in areas of extensive road encroachment. Buffer establishment and/or augmentation could be conducted independent of other project implementation in most instances. Maps of specific potential project areas follow the table.

Table 26. Potential project prioritization for the Stevens Branch corridor planning Project area

Stevens Branch Watershed 2008 Phase 2 Prioritized Project and Strategy Summary								
Project No.	Reach/ Segment Condition Sensitivity	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility & Priority	Other Social Benefits	Costs	Land Use Conversion & Landowner Commitment	Potential Partner Commitments
1	All of Project Area	Extensive straightening and frequent loss of floodplain access, escalating erosion conflicts due to adjustments	FEH and belt-width-based corridor planning, protection of attenuation assets.	Feasible, high priority; delineation process largely developed Development pressures in watershed likely to continue, upstream impacts affect success of projects	Flood hazard reduction, fisheries protection, prime farmland protection, viewshed preservation, water quality protection, oversight of management activities affecting stream function	Development of FEH corridor; outreach and educational materials; policy development and implementation	Depends on options chosen; see VT ANR Municipal Guide to Fluvial Erosion Hazard Mitigation (Literature Cited section of this report)	Towns of Barre, Barre City, and Williamstown FWR;CVRPCVT ANR-RMP
2	Numerous reaches High Priority (In order of priority): M11-A,B,C M15-A, M10-A	Bank erosion, encroachment leading to bank destabilization and increased flows	Buffer protection and enhancement and corridor easement projects	Feasible, high priority; data available; cheap; easy to promote with landowners; funding available for easement projects	Water quality protection, fisheries protection, flood hazard reduction	Outreach; materials and planting costs; easement development costs	Landowner commitment critical. Potential Land Use conversion of buffer areas.	Private Landowners; FWR, CVRPC, VT ANR-RMP, CREP
3	Numerous reaches High Priority (In order of priority): M1.10-B, M1.11-B, T3.01-A, T3.01-B, T3.02B, T3.03-A, T3.04-D, T3.05-A	Increased flow, downstream reaches incised	Collect and assemble stormwater input data for reaches; develop plan for mitigating flow	Feasible, high priority; data available; towns may have model inventories and budgeting	Water quality protection, fisheries protection, flood hazard reduction	Data assembling; outreach and education; alteration costs where appropriate	Private landowners are key to success	Towns of Barre, Barre City, and Williamstown Private landowners; FWR;CVRPC VT ANR-RMP
4	Numerous reaches	Downstream reaches incised, sediment discontinuities	Collect and assemble geomorphic data for bridges and culverts;	Feasible, high priority; data already available; sizing recs expected	Flood hazard reduction; fisheries	Data collection and assembling; replacement costs		Towns of Barre, Barre City, and WilliamstownFWR;C

Stevens Branch Watershed 2008 Phase 2 Prioritized Project and Strategy Summary								
Project No.	Reach/ Segment Condition Sensitivity	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility & Priority	Other Social Benefits	Costs	Land Use Conversion & Landowner Commitment	Potential Partner Commitments
	High Priority (In order of priority): T2S4.01-A, T3.01-A, T3.01-B, T2S4.01-B, T2S4.02-A, T2S4.02-B, M1.14-0, M1.15-B	reducing movement of larger bedload sediments to help rebuild meanders and floodplain access	develop and disseminate sizing recommendations and/ or requirements for private installations and help towns with inventory, prioritization, and capital budgeting	2008; some towns may have model inventories and budgeting	protection	where appropriate		VRPC VT ANR-RMP
5	M1.10B	RB mass failure exacerbated by stormwater outflow.	Re-location of stormwater input	Feasible;	Protect fisheries and water quality from increased sediment	Landowner outreach and education; relocation of stormwater flow	Land use conversion minimal; landowner will need to commit to project	Landowners, Barre City Engineers, FWR, RMP
6	M1.10D	Extensive tributary erosion and head cut that has moved up to Route 14. Arrest head	Arrest headcutting at Route 14	Feasible, should fit in with City stormwater management priorities.	Protection of State Highway, improved water quality, protection of fisheries	Replacement of culvert and other structures for arresting headcut	Land use conversion minimal; City road engineer must be on board	Barre City Engineers, VTrans, FWR, RMP
7	M1.15B	Floodplain not accessed on right bank due to berm presence; recent flooding over left bank into developed area	Remove berm	Feasible, should be further evaluated but is possibly simple solution to problematic flooding	Return area of non floodplain habitat to floodplain habitat	Landowner outreach and education, equipment for berm removal and site restoration	Some land conversion of flood-protected land to non-flood-protected land, would need landowner commitment	FWR, RMP, CREP, EQIP
8	T3.01B	Mass failure RB upstream of bridge is threatening house	Stabilize stream bank; redirect stream flow with rock vein	Feasible; financial responsibility needs to be worked out	Water quality protection	Riprap and vein boulders, Installation costs.	Landowner commitment needed, City commitment	Barre City, Landowner at site, FWR, RMP

Stevens Branch Watershed 2008 Phase 2 Prioritized Project and Strategy Summary								
Project No.	Reach/ Segment Condition Sensitivity	Site Description Including Stressors and Constraints	Project or Strategy Description	Technical Feasibility & Priority	Other Social Benefits	Costs	Land Use Conversion & Landowner Commitment	Potential Partner Commitments
		above					needed.	
9	T3.03A	Gully formation on left valley wall is adding sediment to Jail Branch and is headcutting.	Arrest head cut in tributary gully	Potentially feasible; needs further evaluation to determine source, assess future erosion risk, and consider value of intervention	Landowner education, protection of water quality and fisheries.	Landowner outreach and education, materials and installation costs.	Minimal Land use conversion; needs landowner commitment.	Site landowners, Barre Town, FWR, RMP CREP, EQIP
10	T3.01B	Lack of flood attenuation in city.	Remove berm	Potentially feasible; needs further evaluation to assess value and issues involved	Landowner education; reduced flood hazard downstream	Landowner outreach and education would be extensive considering potential flooding over school playing fields; cost of removing berm and stabilizing the site.	Land use conversion possibly; landowner and citizen commitment would have to be high	Barre City Government, Barre City citizens, landowners, FWR, RMP.

Project maps for Project Priority Numbers 5-10 are found in Figures 63-68. For projects involving multiple reaches (1-4), refer to reach scale maps in Section 6.1 Reach Descriptions.

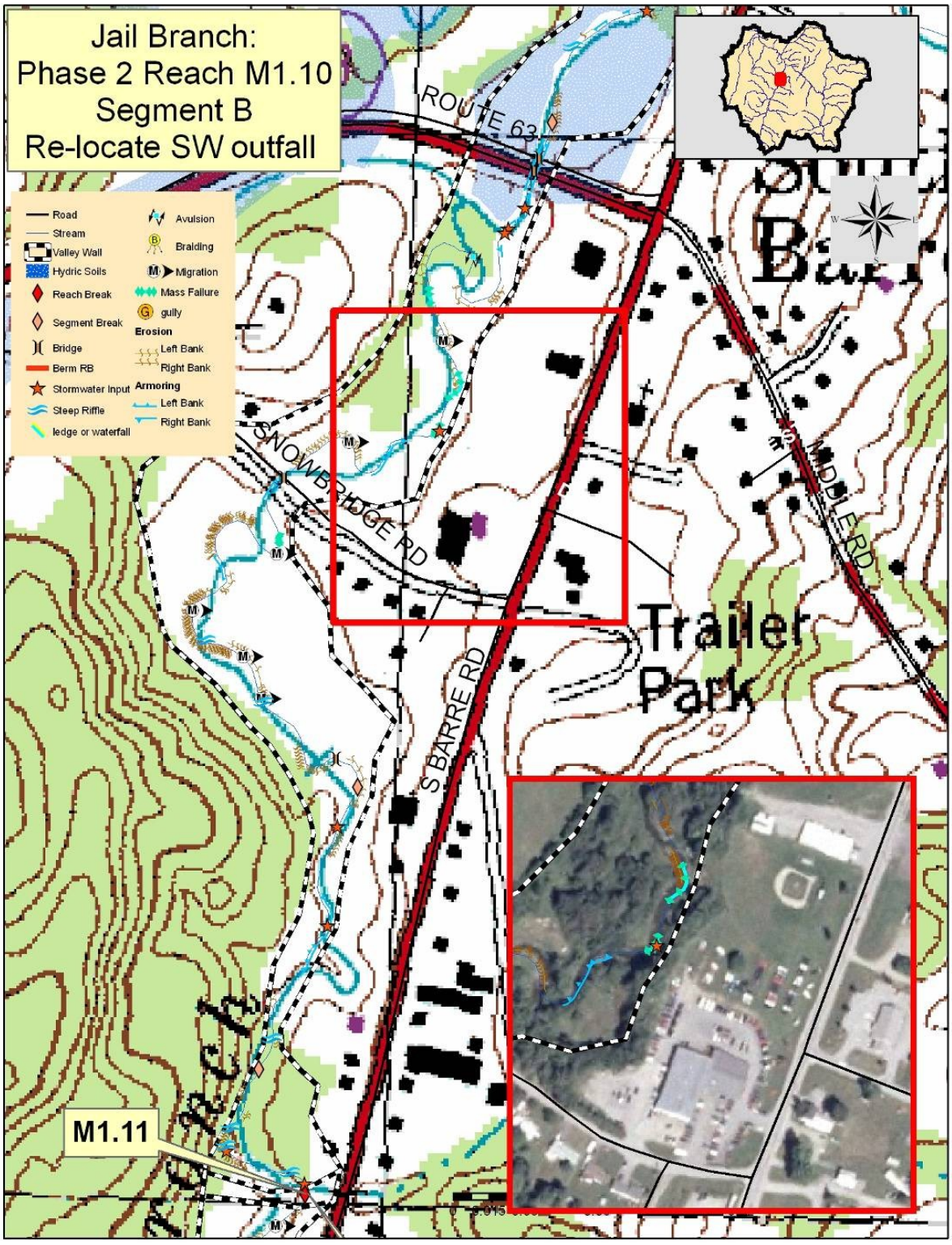

Figure 63: Project priority #5; Re-location stormwater output so as to reduce impacts on mass failing stream bank.

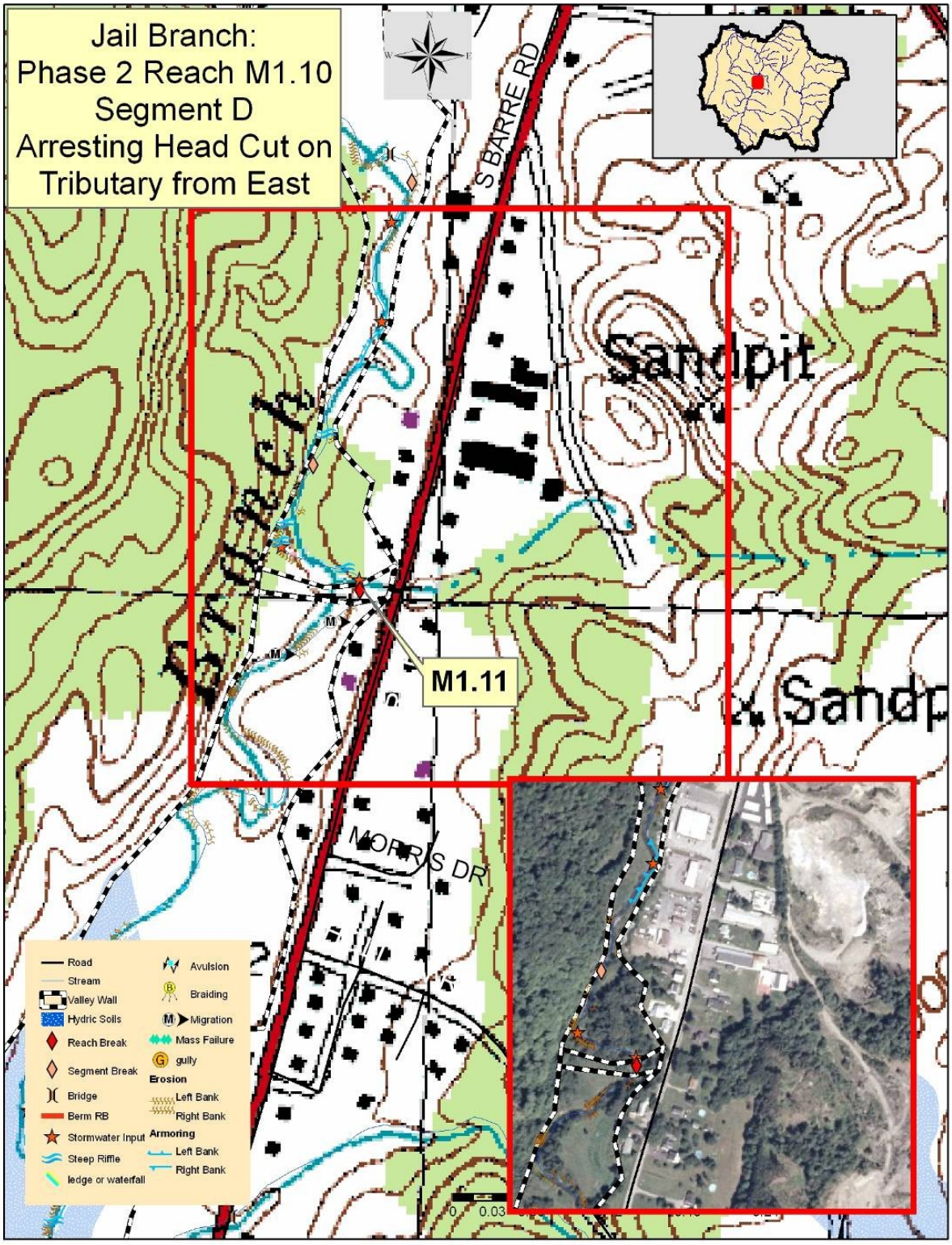

Figure 64: Project priority #6; Arrest head cut on tributary coming in from sandpit region to east. Head cut is arrested temporarily at Route 14.

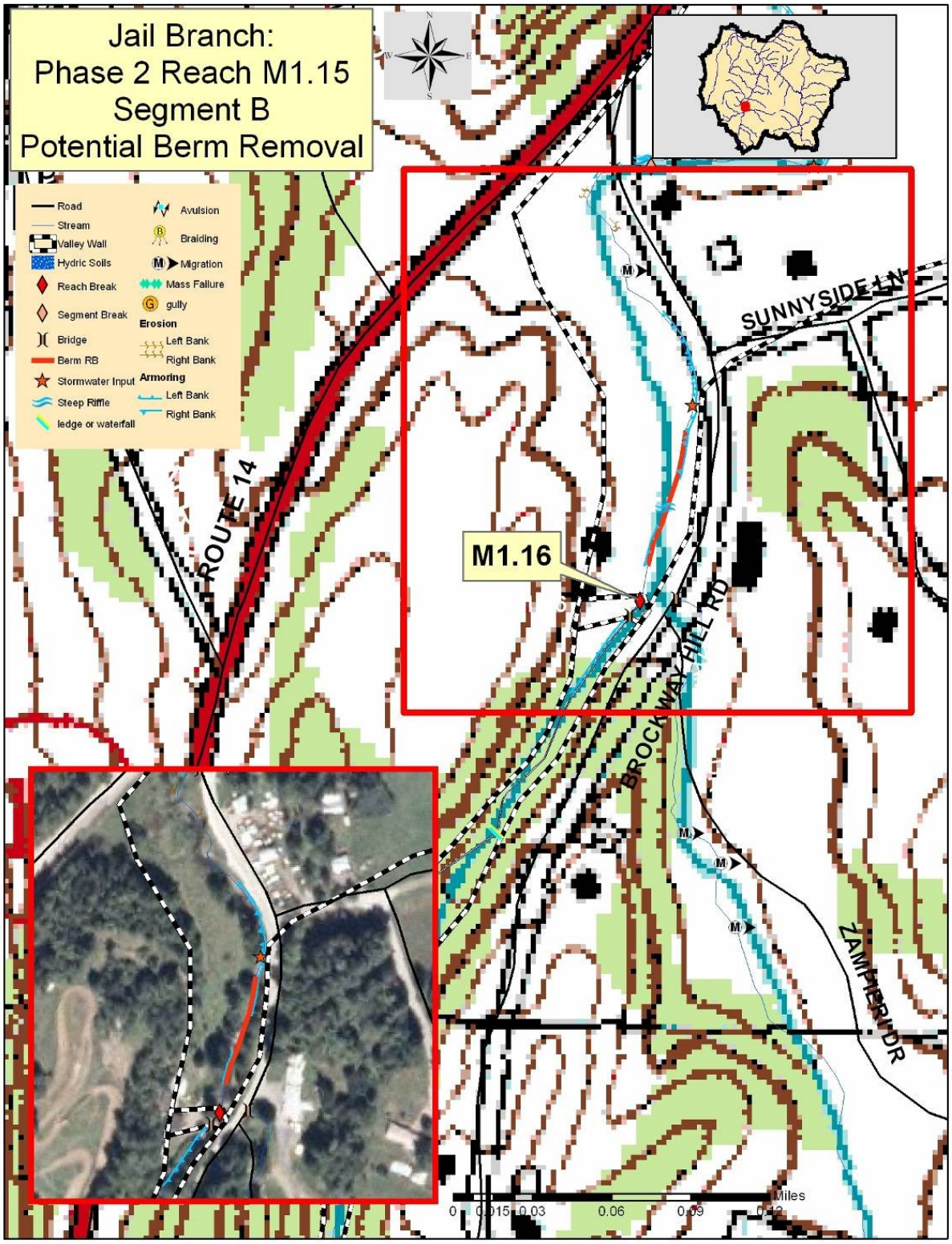

Figure 65: Project priority #7; berm removal at the top of reach M1.15 to gain attenuation potential.

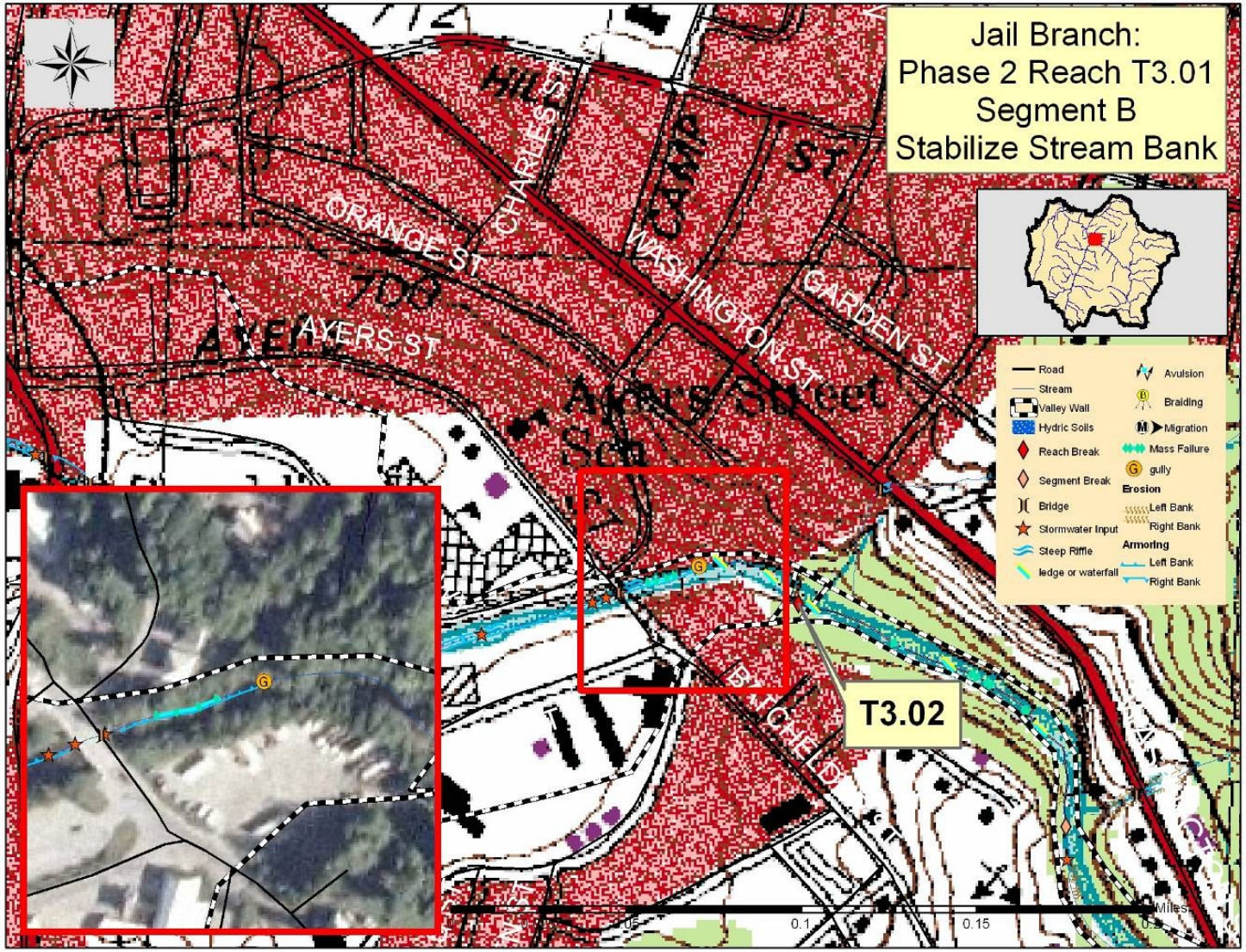

Figure 66: Project priority #8; Stabilize stream bank with mass failure threatening existing house and redirect stream water away from bank.

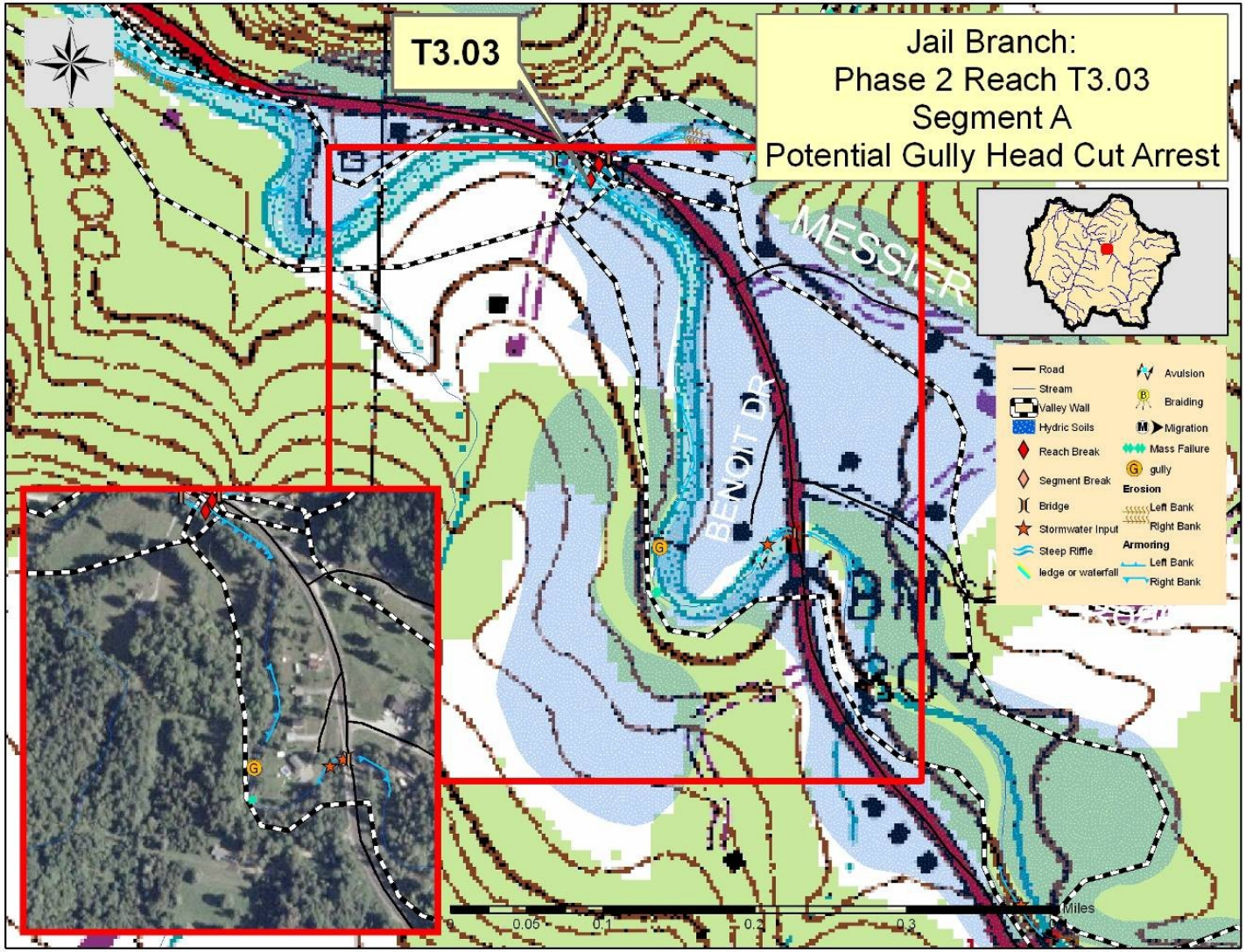

Figure 67: Project priority #9; Evaluation potential for continuing sediment imputs from this gully and potential for arresting headcutting there.

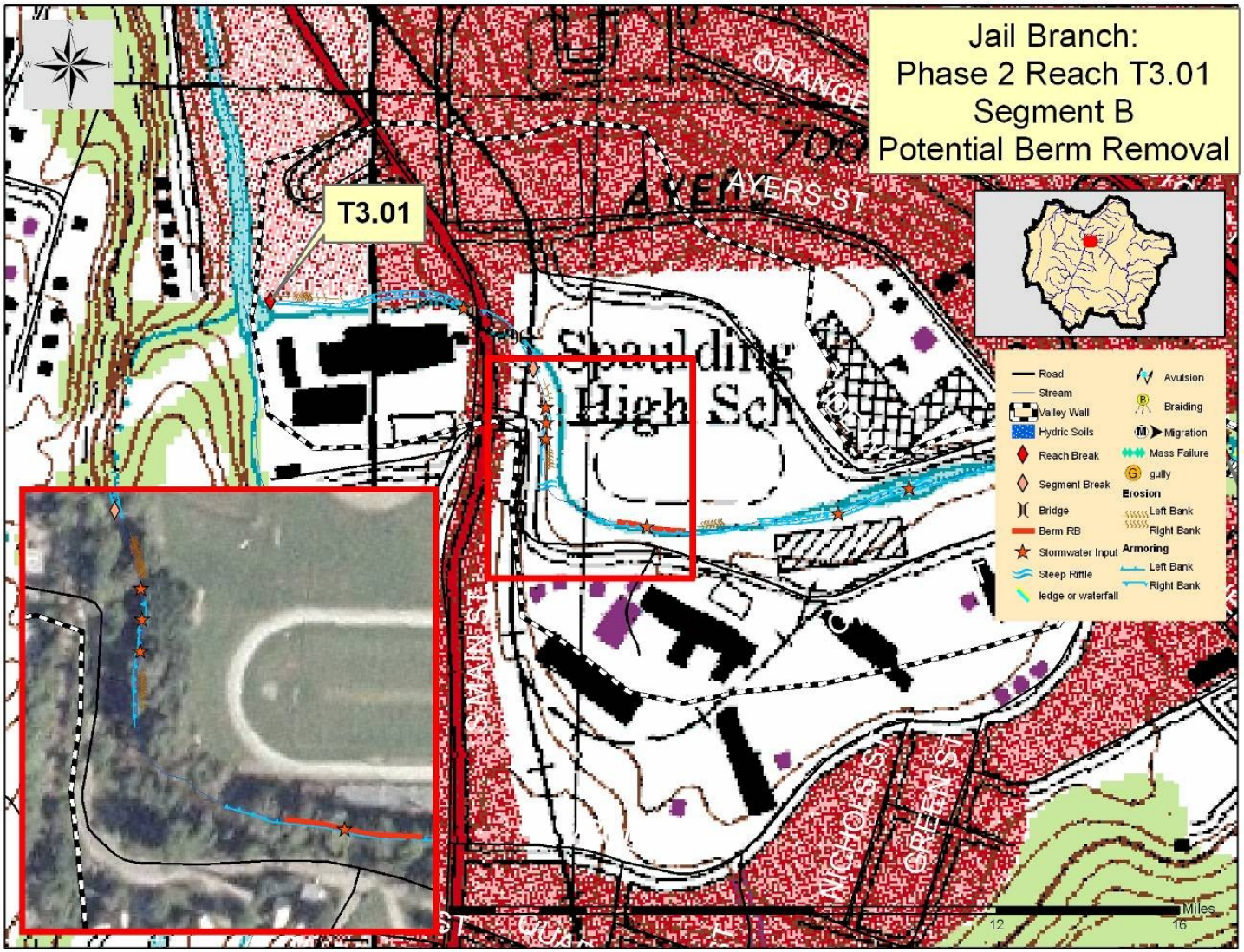

Figure 68: Project priority #10; evaluation potential attenuation benefits if berm is removed along right bank of school property. Impacts on school property need to be assessed.

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APPENDIX A: EXPLANATION OF TERMS

STREAM BED FORMS

Cascade: Generally occur in very steep channels, narrowly confined by valley walls. Characterized by longitudinally and laterally disorganized bed materials, typically bedrock, boulders, and cobbles. Small, partial channel-spanning pools spaced < 1 channel width apart common.
Step-Pool: Often associated with steep channels, low width/depth ratios and confining valleys. Characterized by longitudinal steps formed by large particles (boulder/cobbles) organized into discrete channel-spanning accumulations that separate pools, which contain smaller sized materials. Step-pool systems exhibit pool spacing of 1 to 4 channel widths.
Plane Bed: Occur in moderate to high gradient and relatively straight channels, have low width/depth ratios, and may be either unconfined or confined by valley walls. Composed of sand to small boulder-sized particles, but dominated by gravel and cobble substrates. Channel lacks discrete bed features (such as pools, riffles, and point bars) and may have long stretches of featureless bed.
Riffle-Pool: Occur in moderate to low gradient and moderately sinuous channels, generally in unconfined valleys, and has well-established floodplain. Channel has undulating bed that defines a sequence of bars, pools, and riffles. Pools spaced every 5 to 7 channel widths in a self-formed (alluvial) riffle-pool channel.
Dune-Ripple: Usually associated with low gradient and highly sinuous channels. Dominated by sand-sized substrates. Channel may exhibit point bars or other bedforms forced by channel geometry. Typically undulating bed does not establish distinct pools and riffles.
Bedrock: Lack a continuous alluvial bed. Some alluvial material may be temporarily stored in scour holes, or behind obstructions. Often confined by valley walls.
Braided: Multiple channel system found on steep depositional fans and deltas. Channel gradient is generally the same as the valley slope. Ongoing deposition leads to high bank erosion rates. Bed features result from the convergence/divergence process of local bed scour and sediment deposition. Unvegetated islands may shift position frequently during runoff events. High bankfull widths and very low meander (belt) widths.

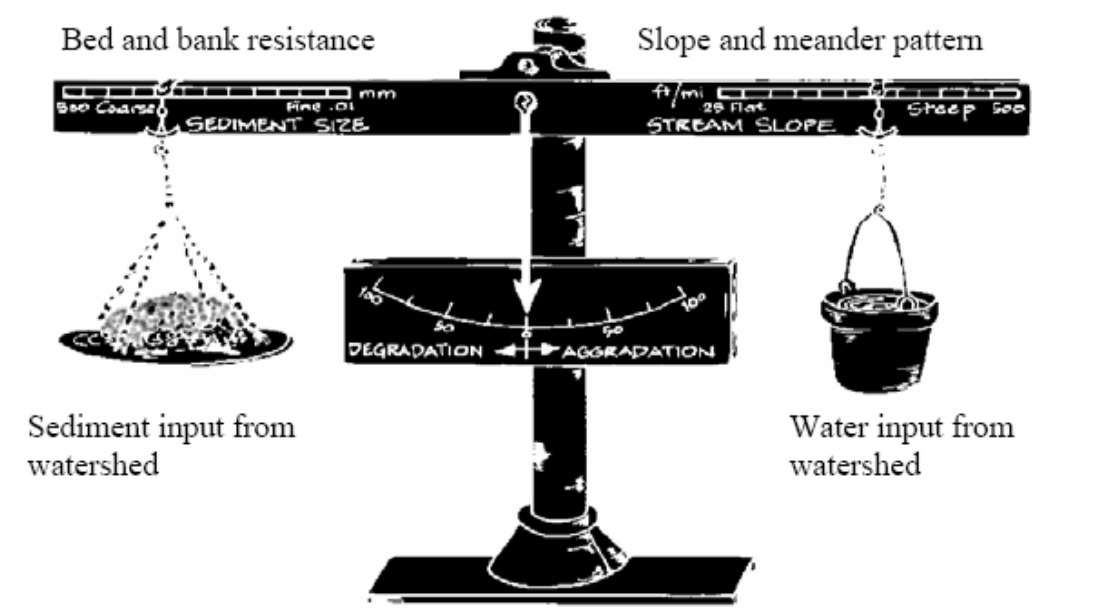
STREAM TYPE CLASSIFICATION

Stream Type	(1) Entrenchment (+ or – 0.2)	(2) Width/depth (+ or – 2)	(3) Sinuosity (+ or – 0.2)	(4) Slope % See note
A – Single Thread	<1.4 entrenched	<12 Low	<1.2 Low	4-10%
G– Single Thread	<1.4 entrenched	<12 Low	>1.2 Low to Moderate	2-4%
F– Single Thread	<1.4 entrenched	>12 Mod to high	>1.2 Low to Moderate	<4%
B– Single Thread	1.4-2.2 moderately entrenched	>12 Moderate	>1.2 Low to Mod	2-4%
E– Single Thread	>2.2 slightly entrenched	<12 Low	>1.5 High	<2%
C– Single Thread	>2.2 slightly entrenched	>12 High	>1.2 Moderate	<2%
D-Multiple Thread		>40 Very high	<1.2 Low	<4%

STREAM EQUILIBRIUM AND EVOLUTION

Within a reach, the principals of stream equilibrium dictate that stream power and sediment will tend to distribute evenly over time (Leopold 1994). Changes or modifications to watershed inputs and hydraulic geometry create disequilibrium in the balance of these forces and lead to an uneven distribution of power and sediment. Whether a project works with or against the physical processes at play in a watershed is primarily determined by examining the source, volumes, and attenuation of flood flows and sediment loads from one reach to the next within the stream network. If increasing

loads are transported through the network to a sensitive reach, where conflicts with human investments are creating a management expectation, little success can be expected unless the restoration design accommodates the increased load or finds a way to attenuate the loads upstream (VT ANR 2007).



The channel balance indicates how changes in watershed inputs influence channel adjustment processes (Lane 1955).

Sediment Regime: Pertinent data for characterizing existing sediment regime using Phase 2 data (VT ANR RCPG 2007)

<table>
<tr><td rowspan="3">Transport</td><td rowspan="3">Incision <1.3</td><td colspan="3">Valley type = NC, SC, or bedrock gorge</td><td rowspan="3"></td></tr>
<tr><td rowspan="2">Valley type = NW</td><td colspan="2">A, B, G, or F</td></tr>
<tr><td colspan="2">Bc, C, E, or D</td></tr>
<tr><td>Coarse equilibrium & fine deposition</td><td colspan="4">Valley type = BD or VB</td><td></td></tr>
<tr><td>Confined storage & transport</td><td rowspan="4">Incision ≥1.3</td><td colspan="4">Valley type = NC or SC</td><td></td></tr>
<tr><td>Unconfined storage & transport</td><td rowspan="3">Valley type = NW, BD, VB</td><td rowspan="2">Channel evolution stage = I/II/III/V</td><td>Bank armoring and straightening ≥50%</td><td></td></tr>
<tr><td>Fine storage & transport, coarse deposition</td><td>Bank armoring or straightening <50%</td><td></td></tr>
<tr><td colspan="2">Channel evolution stage = IV</td><td></td></tr>
</table>

Once a stream has entered a state of disequilibrium, it will begin a series of channel adjustments or evolutions to fulfill the physical mandates of restoring equilibrium.

Schumm (1977 and 1984) has described five stages of channel evolution (below) for reaches such as those found in the Project area, where the stream has a bed and banks that are sufficiently erodible to be shaped by the stream over time, paraphrased from the SGA protocols (VT ANR 2006, Appendix C) as follows:

I. Stable — in regime, reference to good condition. Insignificant to minimal adjustment; planform is moderate to highly sinuous.

II. Incision — Fair to poor condition, major to extreme channel degradation. High flow events are contained in the channel, and channel slope is typically increased.

III. Widening/Migration — Fair to poor condition, major to extreme widening and aggradation.

IV. Stabilizing — Fair to good condition, major reducing to minor aggradation, widening and planform adjustments

V. Stable — In regime, reference to good condition. Insignificant to minimal adjustment.

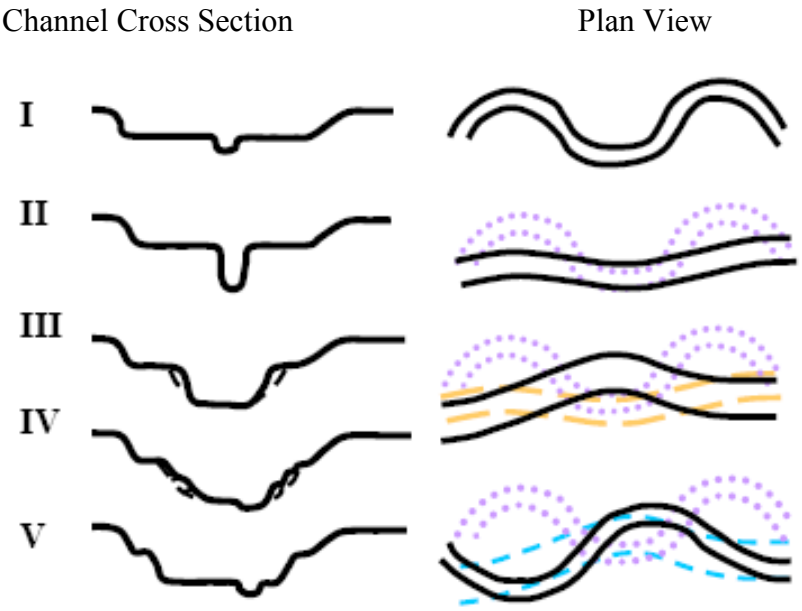
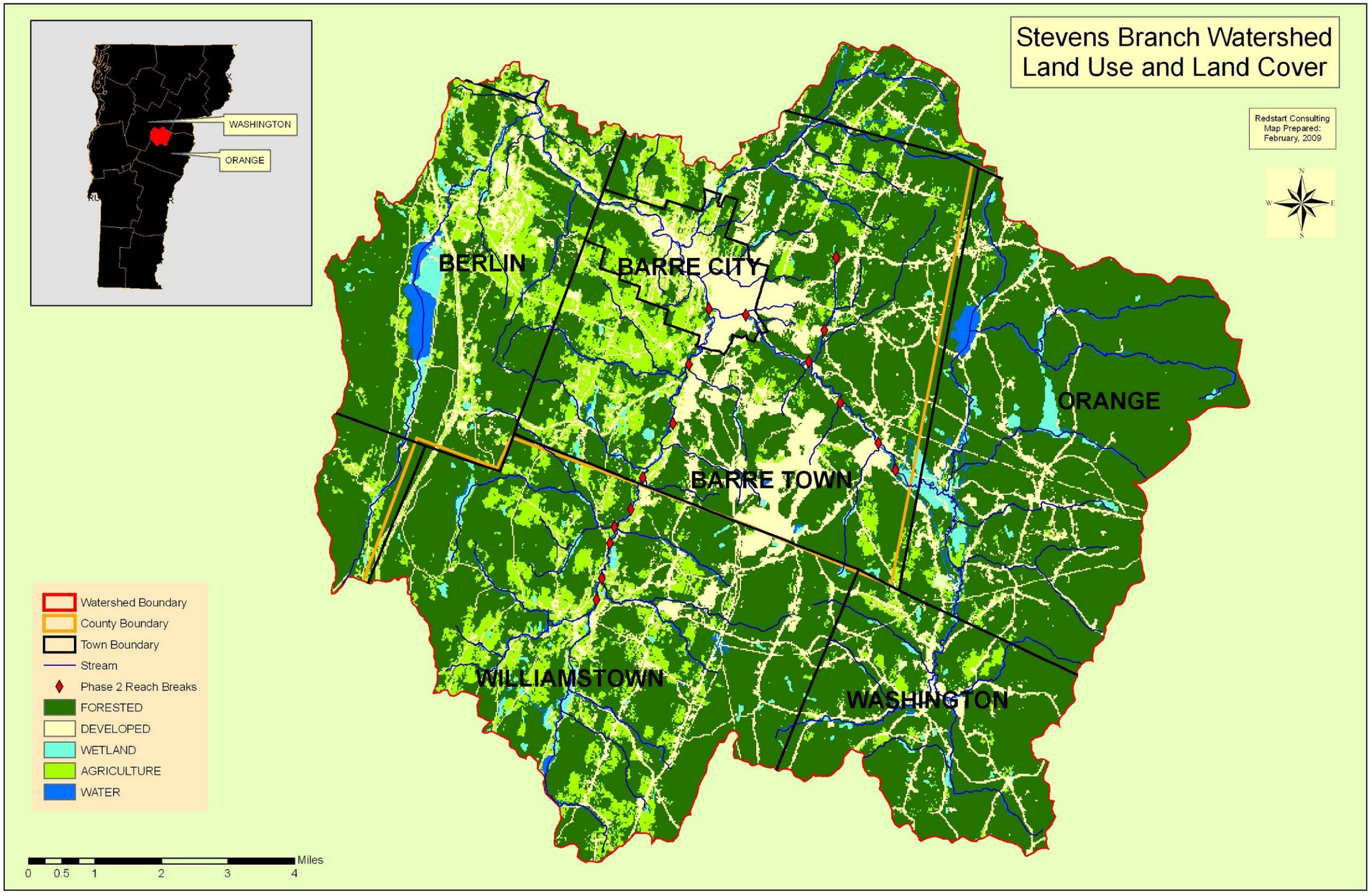
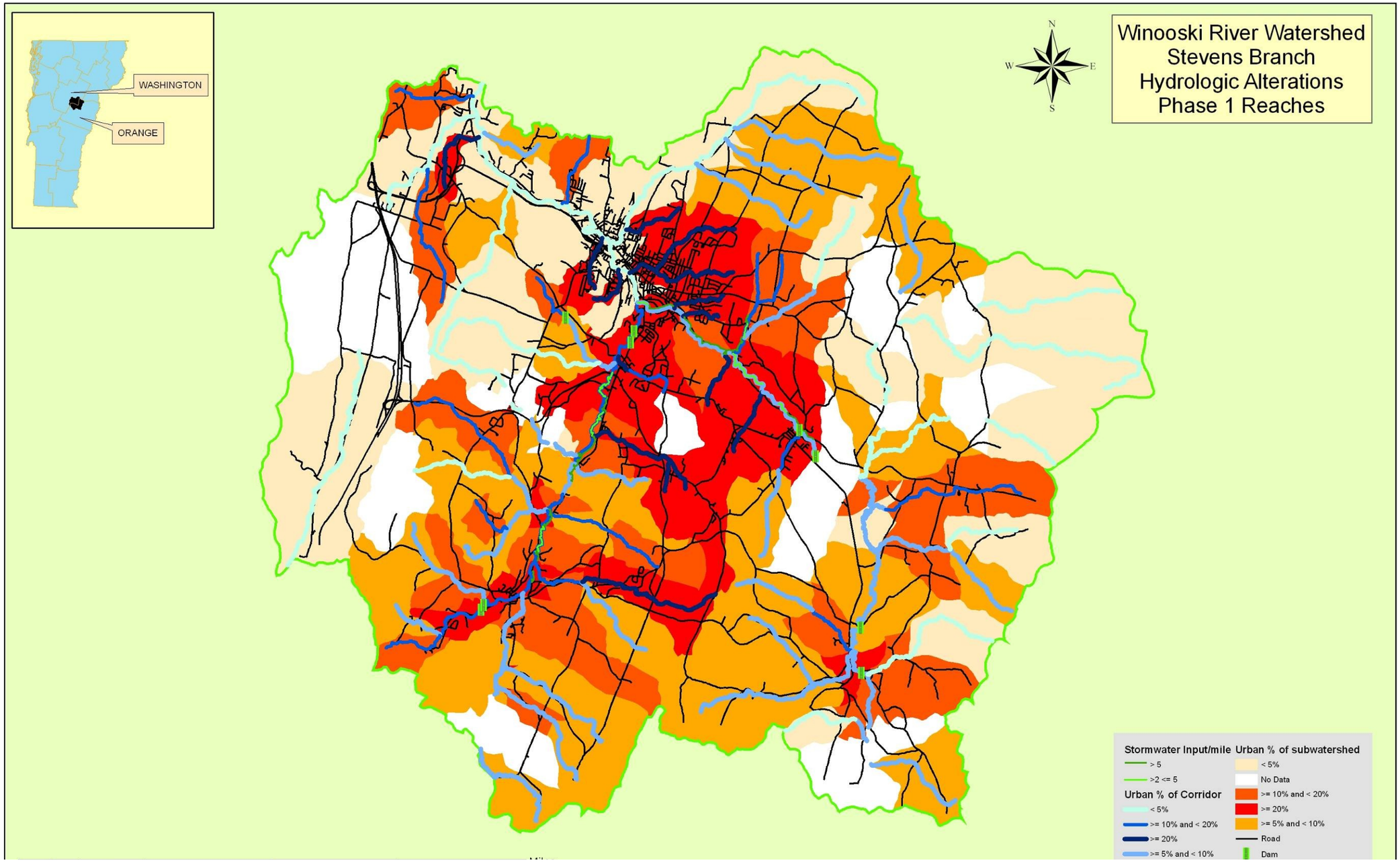


Figure 1. Channel evolution process showing channel downcutting or incision in Stage II (cross section), widening through Stages III and IV, and floodplain reestablishment in Stage V. Stages I and V represent equilibrium conditions. Plan view shows straightening and meander redevelopment that accompany cross-section changes, a flood-driven process taking place over decades (VT ANR 2007b).

APPENDIX B: ENLARGED MAPS



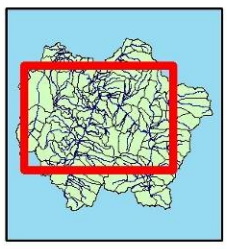

WASHINGTON
ORANGE
N
W
E
S
Winooski River Watershed
Stevens Branch
Hydrologic Alterations
Phase 1 Reaches
Stormwater Input/mile
> 5
>2 <= 5
Urban % of Corridor
< 5%
>= 10% and < 20%
>= 20%
>= 5% and < 10%
Urban % of subwatershed
< 5%
No Data
>= 10% and < 20%
>= 20%
>= 5% and < 10%
Road
Dam

Stevens Branch Project Area
Stevens Branch, Jail Branch, and Honey Brook
Existing Sediment Regime with Vertical and Lateral Constraints to Channel Evolution

Lateral Constraints consist of roads and buildings within the stream corridor that would prevent lateral movement of the stream channel. Since constraints extend beyond the physical features, roads have been buffered by 50 feet and buildings have been buffered by 166 feet.

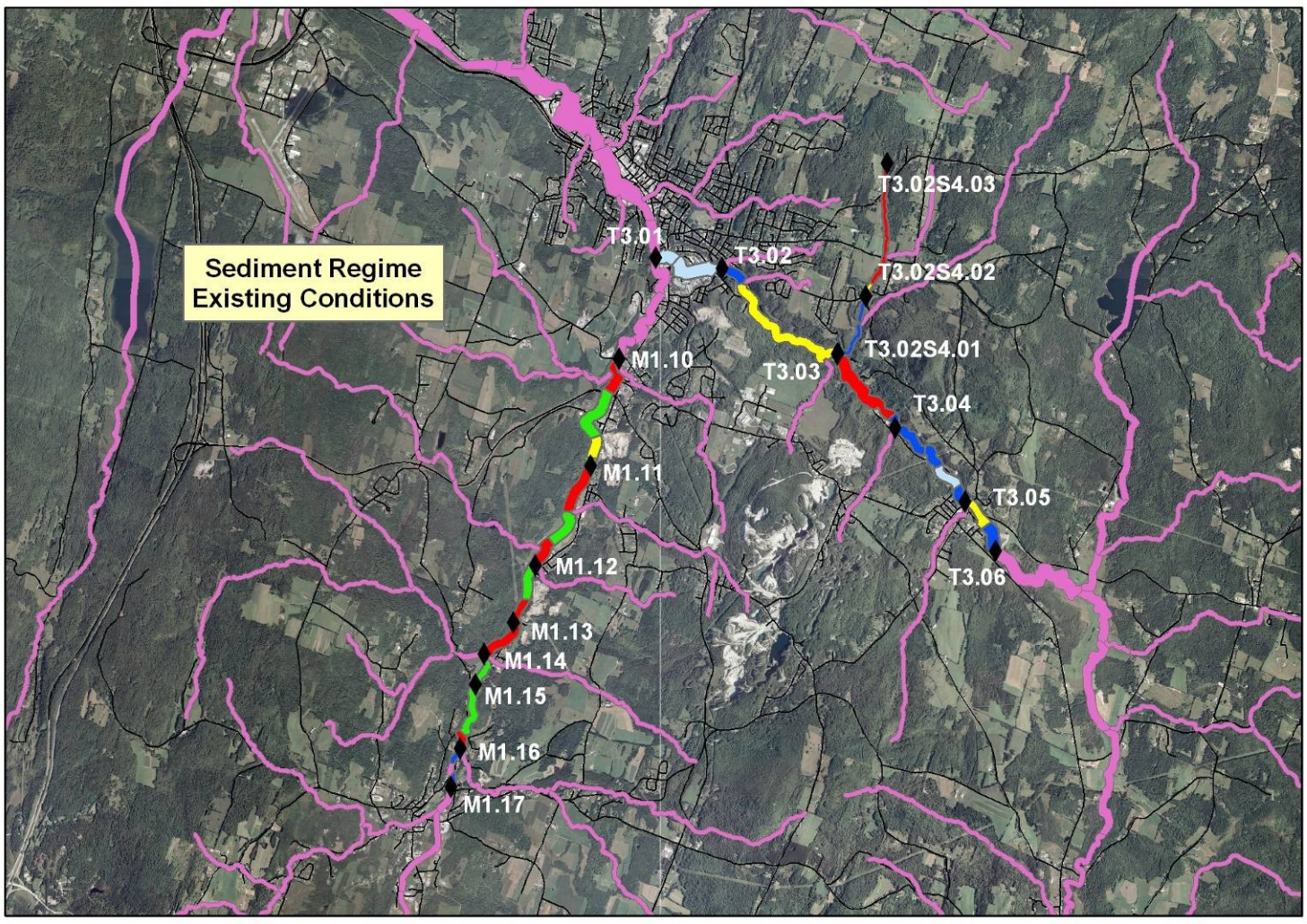
T3.01
T3.02
T3.02S4.03
T3.02S4.02
T3.02S4.01
T3.03
T3.04
T3.05
T3.06
M1.10
M1.11
M1.12
M1.13
M1.14
M1.15
M1.16
M1.17

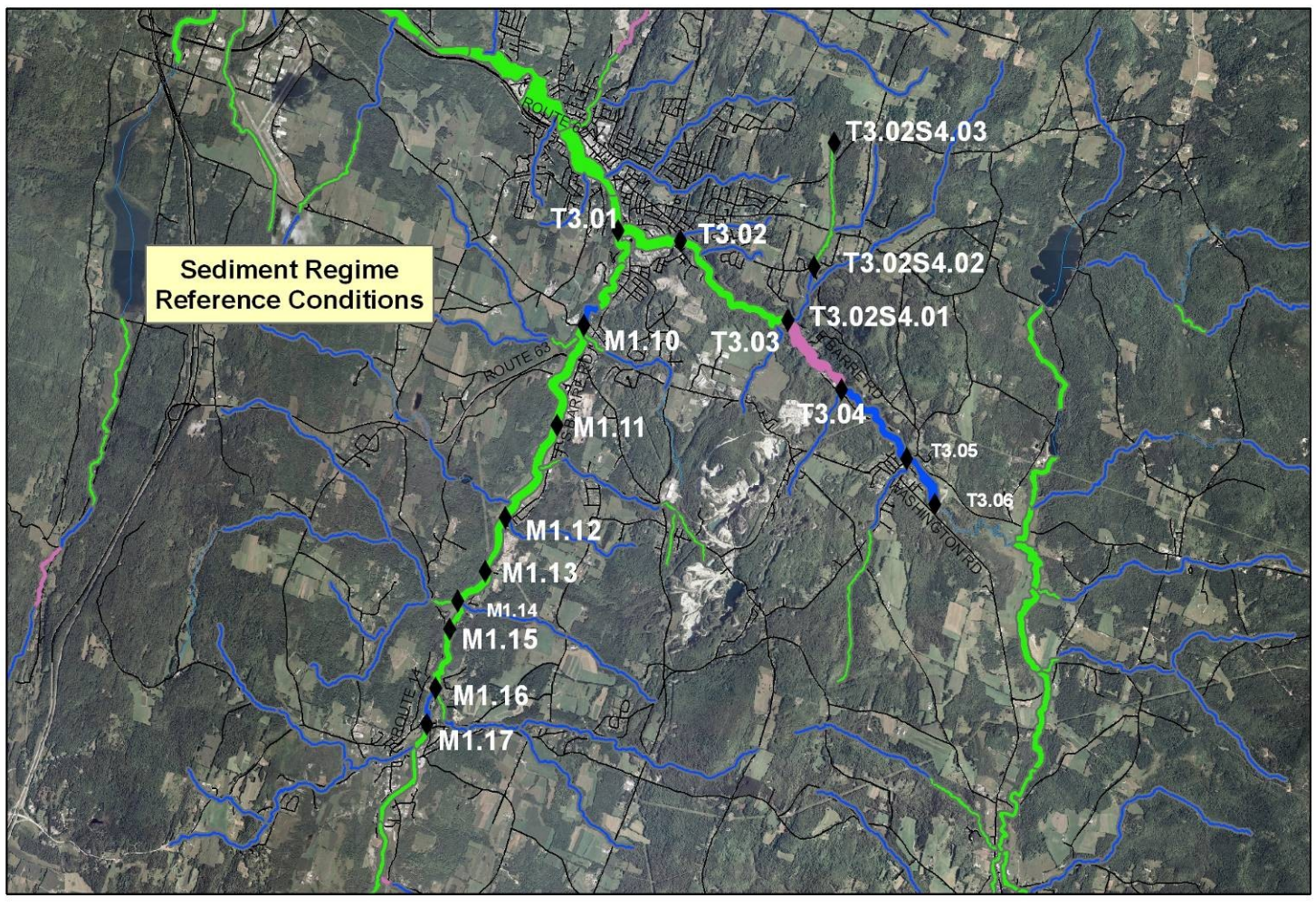
Reach Break
Roads
Parcel Boundaries
Stream
Grade Controls
Human Constructed
Natural
Lateral Constraints
Buffered Roads and Buildings
Sediment Regime
Unknown
Coarse Equilibrium (in=out) and fine deposition
Confined Source and Transport
Fine Source and Transport and Coarse Deposition
Transport
Unconfined Source and Transport



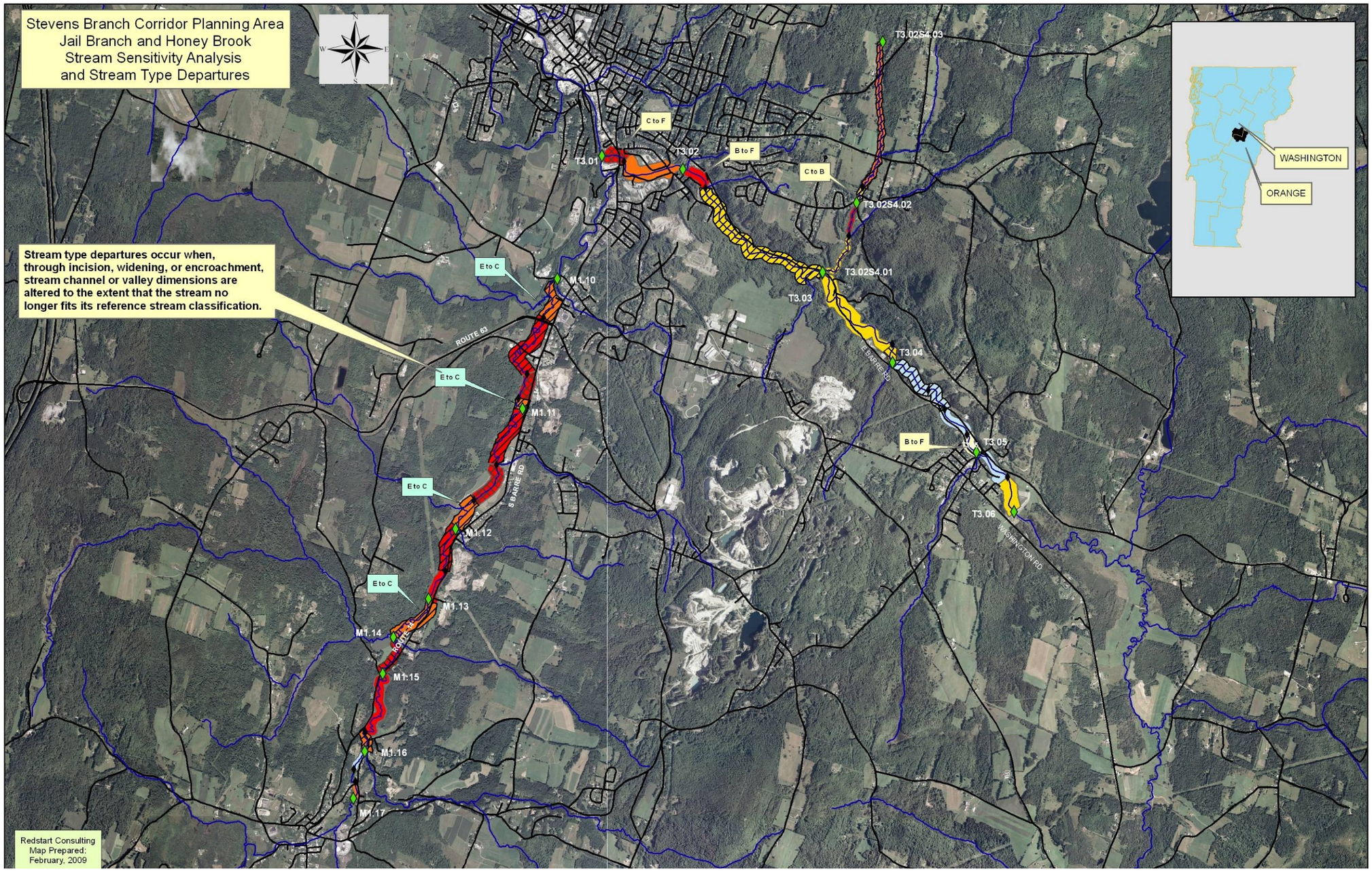
Roads
Stream
Sediment Regime
Unknown
Coarse Equilibrium (in=out) and fine deposition
Confined Source and Transport
Fine Source and Transport and Coarse Deposition
Transport
Unconfined Source and Transport

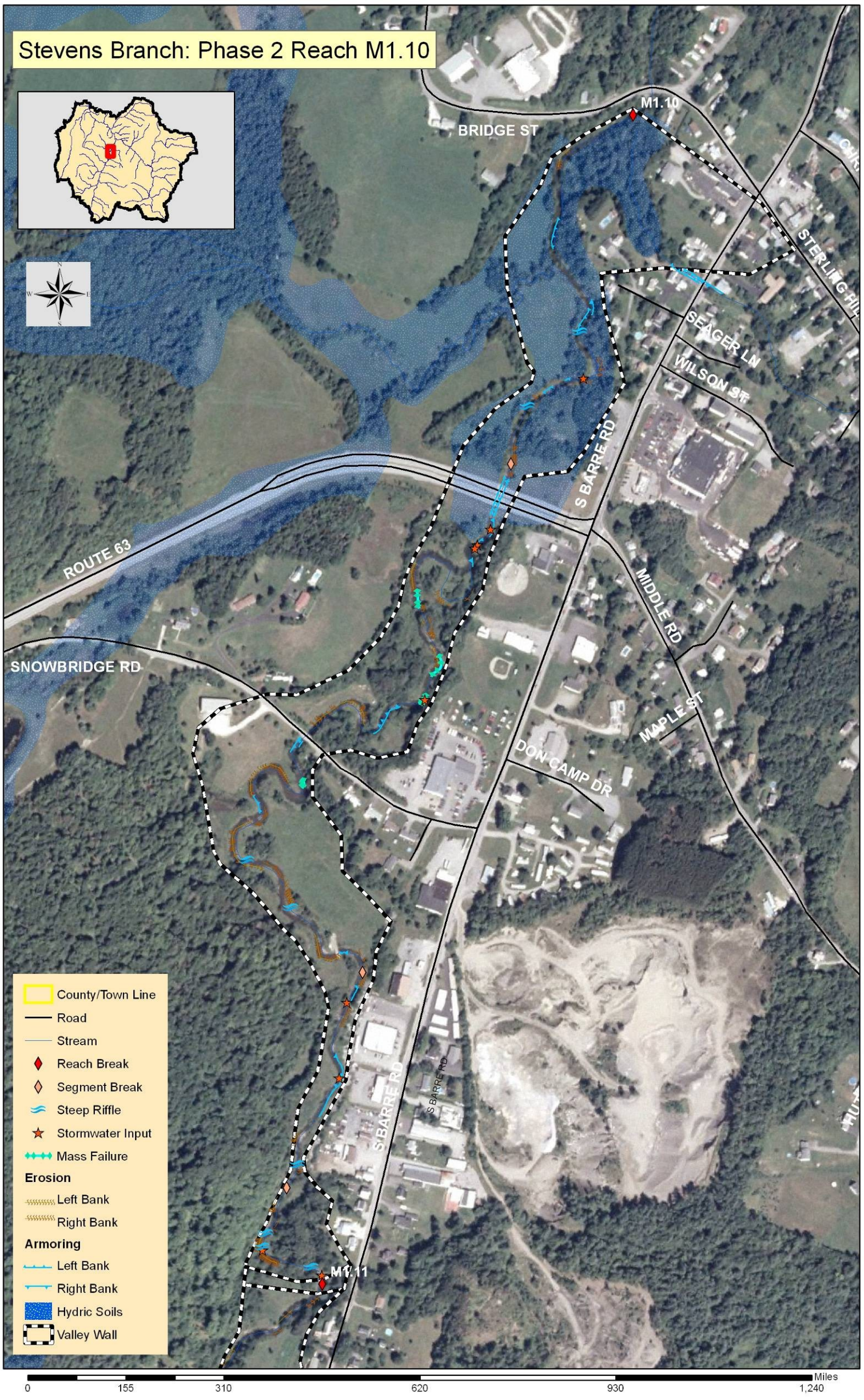
Winooski River Watershed
Stevens Branch
Jail Branch and Honey Brook
Sediment Regime Departures

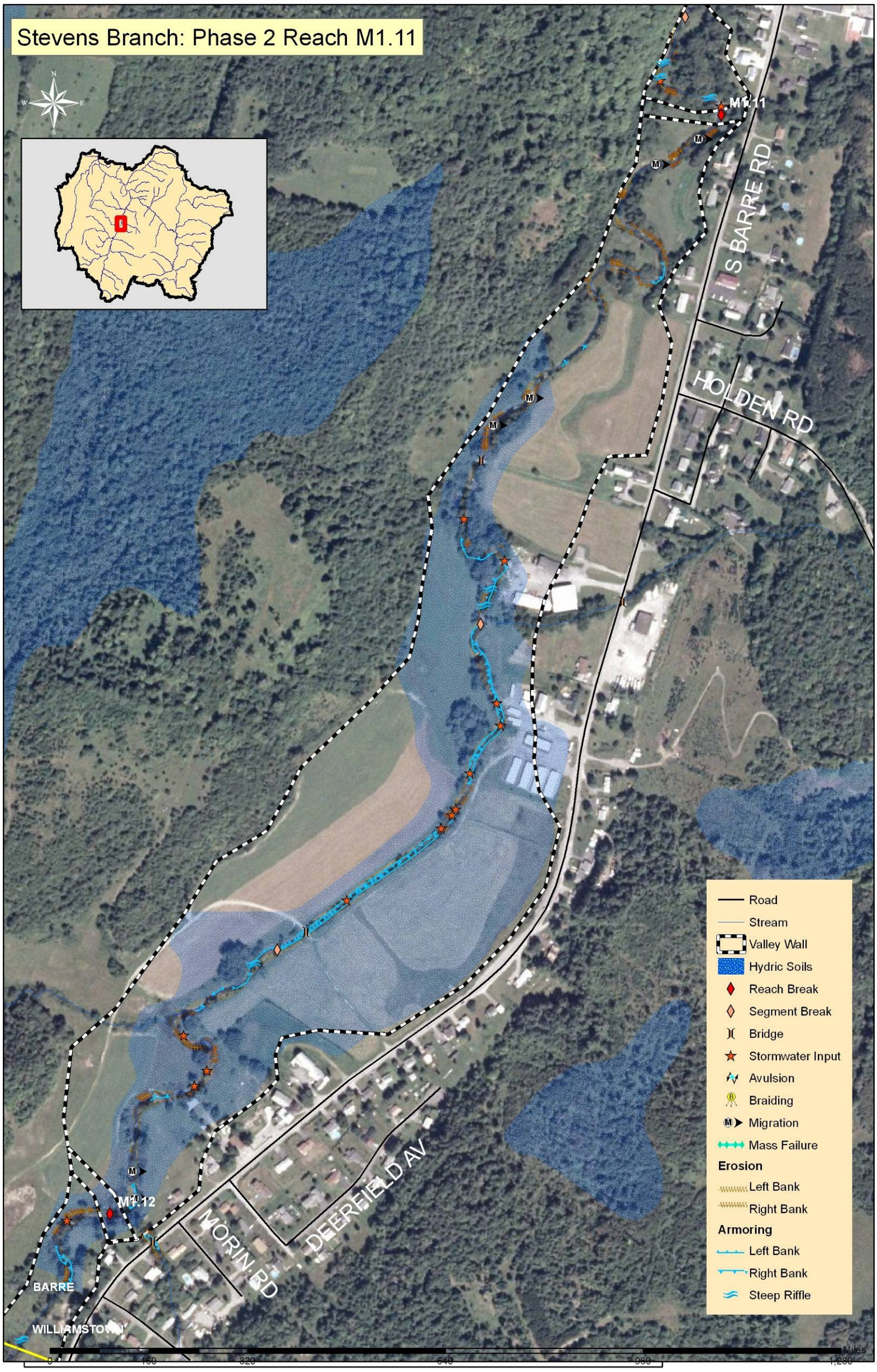


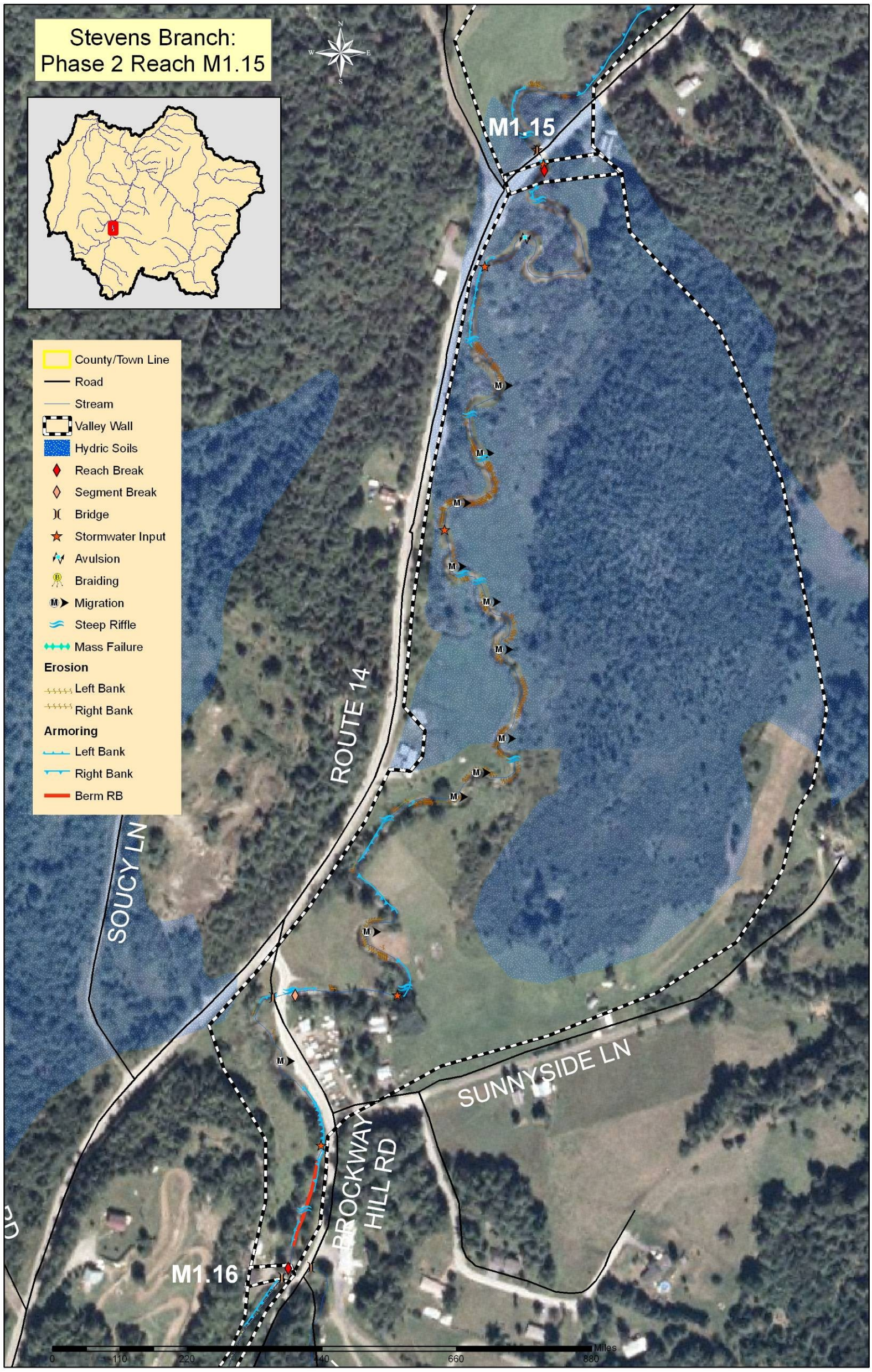


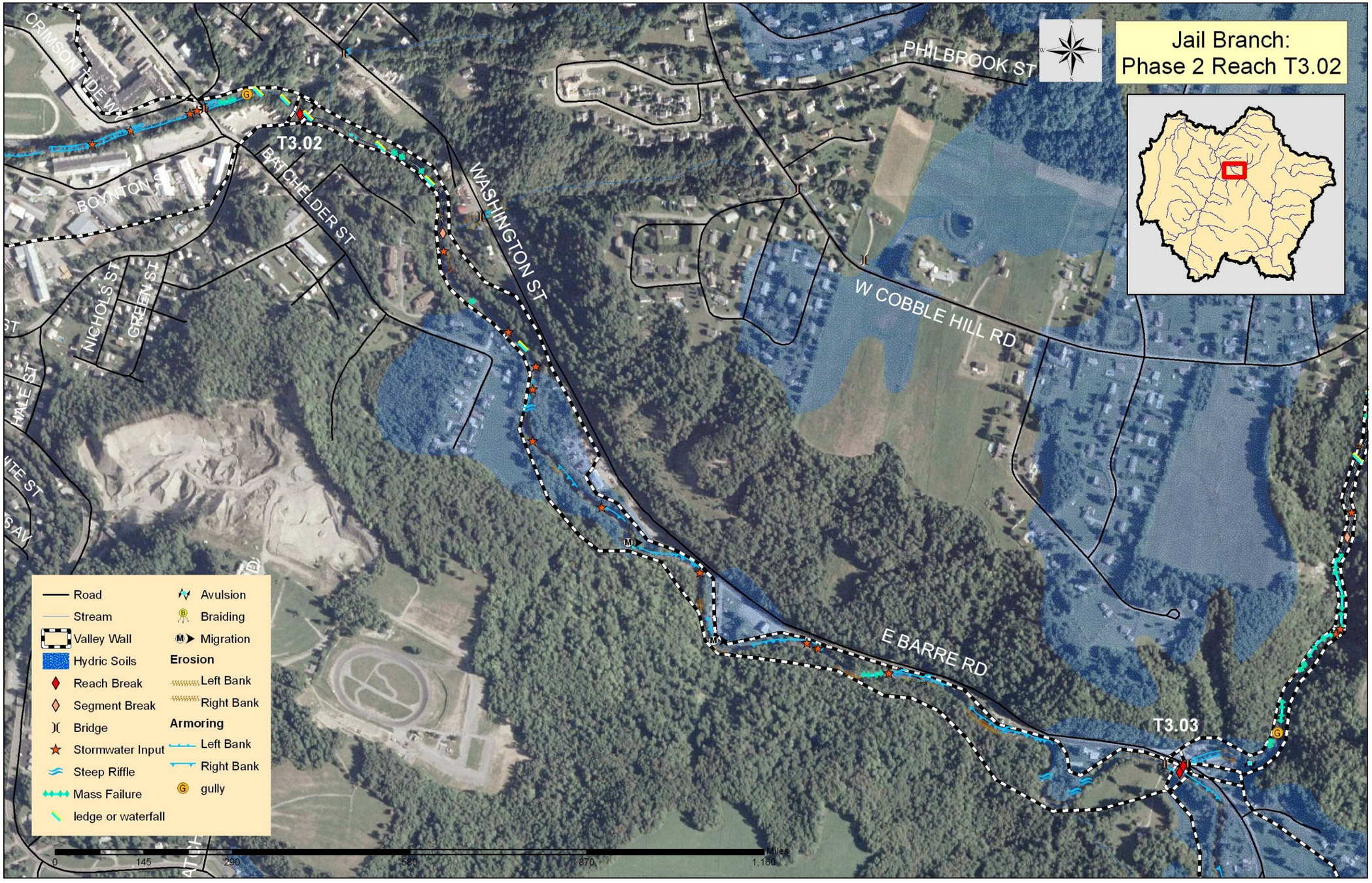
0 5 10 20 30 40 50 60 Miles

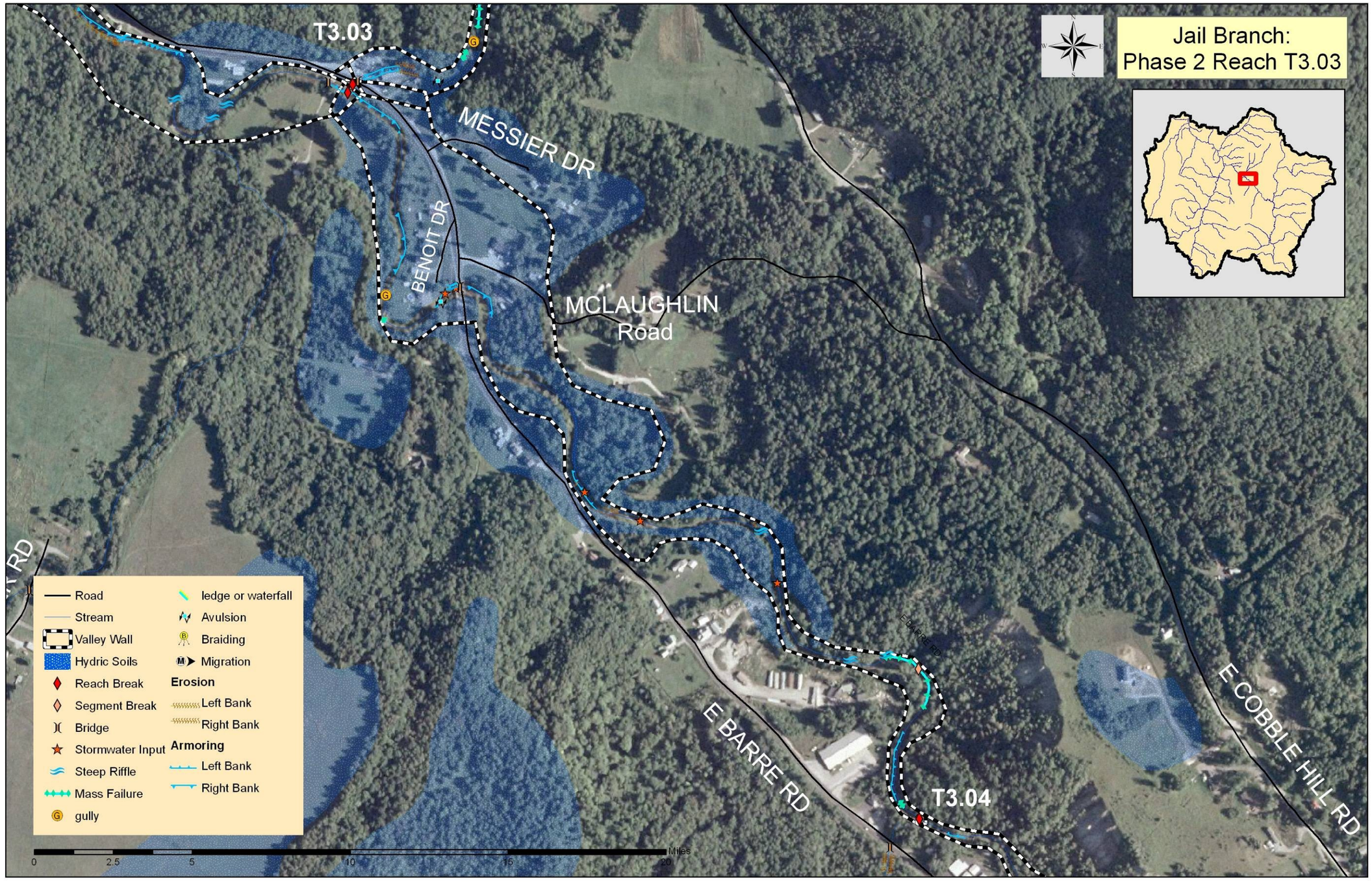

Stevens Branch Corridor Planning Area
Jail Branch and Honey Brook
Stream Sensitivity Analysis
and Stream Type Departures
Stream type departures occur when, through incision, widening, or encroachment, stream channel or valley dimensions are altered to the extent that the stream no longer fits its reference stream classification.
C to F
B to F
C to B
E to C
E to C
E to C
E to C
B to F
T3.01
T3.02
T3.02S4.03
T3.02S4.02
T3.02S4.01
T3.03
T3.04
T3.05
T3.06
M1.10
M1.11
M1.12
M1.13
M1.14
M1.15
M1.16
M1.17
ROUTE 63
S BARRE RD
E BARRE RD
WASHINGTON RD
WASHINGTON
ORANGE
Redstart Consulting
Map Prepared:
February, 2009


Stevens Branch: Phase 2 Reach M1.10
M1.10
M1.11
BRIDGE ST
ROUTE 63
SNOWBRIDGE RD
S BARRE RD
MIDDLE RD
MAPLE ST
DON CAMP DR
SEAGER LN
WILSON ST
STERLING HIL
County/Town Line
Road
Stream
Reach Break
Segment Break
Steep Riffle
Stormwater Input
Mass Failure
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
Hydric Soils
Valley Wall
Miles
0
155
310
620
930
1,240

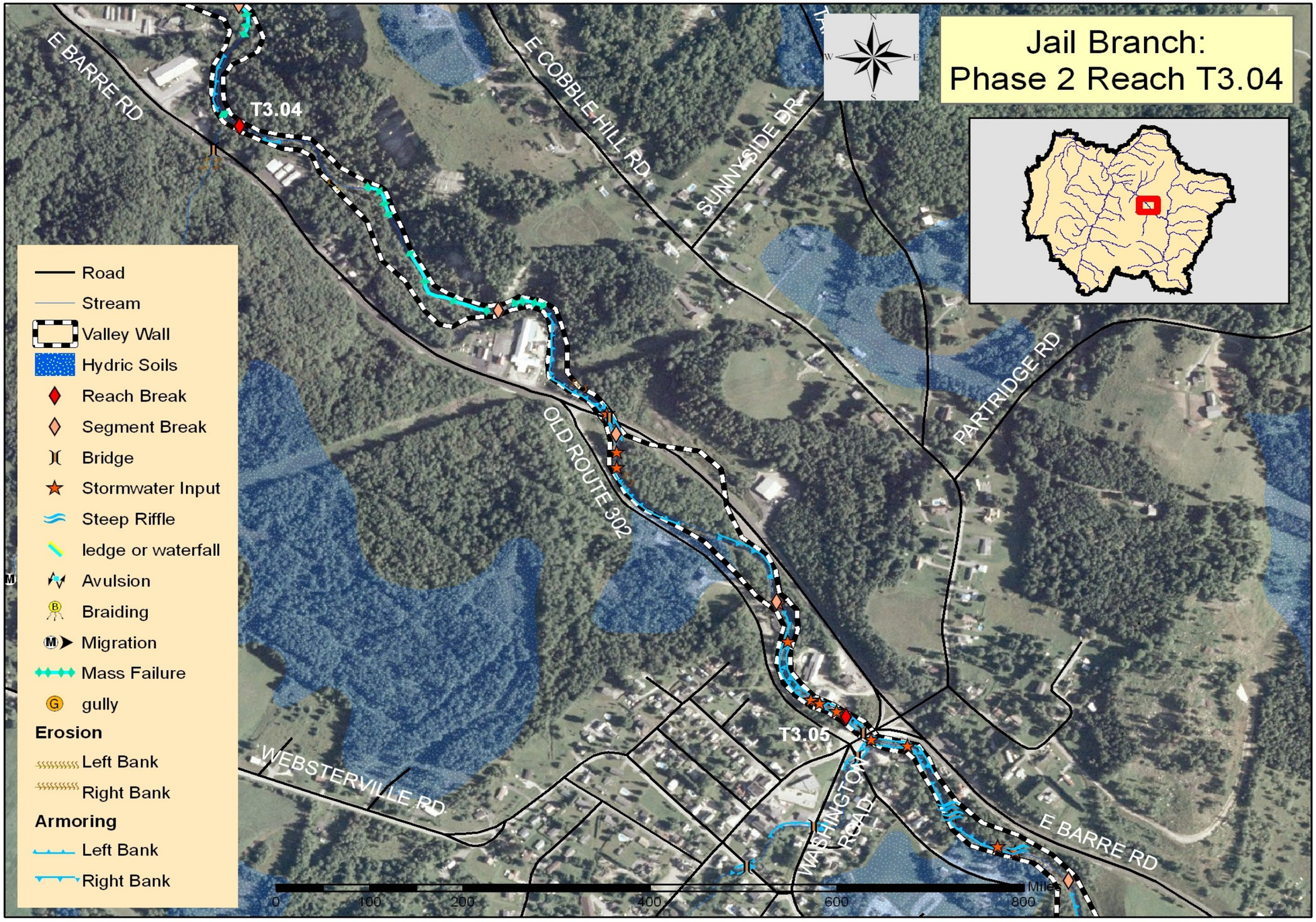

Stevens Branch: Phase 2 Reach M1.11
N
W
E
S
M1.11
M1.12
S BARRE RD
HOLDEN RD
DEERFIELD AV
MORIN RD
BARRE
WILLIAMSTOWN
Road
Stream
Valley Wall
Hydric Soils
Reach Break
Segment Break
Bridge
Stormwater Input
Avulsion
Braiding
Migration
Mass Failure
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
Steep Riffle
0
160
320
640
960
1,280
Miles


Stevens Branch:
Phase 2 Reach M1.15
N
W
E
S
M1.15
M1.16
County/Town Line
Road
Stream
Valley Wall
Hydric Soils
Reach Break
Segment Break
Bridge
Stormwater Input
Avulsion
Braiding
Migration
Steep Riffle
Mass Failure
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
Berm RB
ROUTE 14
SOUCY LN
SUNNYSIDE LN
BROCKWAY HILL RD
0
110
220
440
660
880
Miles


Jail Branch:
Phase 2 Reach T3.02
T3.02
T3.03
CRIMSON TIDE W
BOYNTON ST
BATCHELDER ST
NICHOLS ST
GREEN ST
WASHINGTON ST
PHILBROOK ST
W COBBLE HILL RD
E BARRE RD
Road
Stream
Valley Wall
Hydric Soils
Reach Break
Segment Break
Bridge
Stormwater Input
Steep Riffle
Mass Failure
ledge or waterfall
Avulsion
Braiding
Migration
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
gully
0
145
290
580
870
1,160
Miles


T3.03
MESSIER DR
BENOIT DR
MCLAUGHLIN
Road
E BARRE RD
E COBBLE HILL RD
T3.04
Jail Branch:
Phase 2 Reach T3.03
Road
Stream
Valley Wall
Hydric Soils
Reach Break
Segment Break
Bridge
Stormwater Input
Steep Riffle
Mass Failure
gully
ledge or waterfall
Avulsion
Braiding
Migration
Erosion
Left Bank
Right Bank
Armoring
Left Bank
Right Bank
0
2.5
5
10
15
20
Miles

Jail Branch: Phase 2 Reach T3.04



Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.01**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 1 mile from the Pioneer/River Rd. Intersection in Montpelier on**
1.2 Towns: **Montpelier**
1.3 Downstream Latitude: **44.24**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **528**
2.1 Elevation Downstream: **526**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2944** feet. **0.56** Miles.
2.3 Valley Slope: **0.07** %
2.4.Channel Length: **3167** feet. **0.60** Miles.
2.5 Channel Slope: **0.06** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **115** Square Miles
2.8 Channel Width: **106** feet.
2.9 Valley Width: **1,195** feet.
2.10 Confinement Ratio: **11**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**0-25**
Sub-dominant:	**26-50**	**26-50**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **79 %**
Left **1475.5** Right **1038**
5.4 Channel Straightening: **775** **24 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2830** ft. **89 %**

	One Side		Both Sides	
Road:	**411**	ft.	**1354.9**	ft.
Railroad:	**810**	ft.	**0.0**	ft.
Berm:	**253**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**1188.3**	ft.	**1487**	ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **208.0** Ratio: **2.0**
6.6 Wavelength: **6.09** Ratio: **0.1**

Step 7. Windshield Survey

7.1 Bank Erosion: **1,211.72 ft.**
7.2 Bank Height: **9.81 ft.**
7.3 Ice/Debris Jam Potential: **Debris**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	2 High	1 Low	2 High	2 High	1 Low	1 Low	2 High	2 High	1 Low	2 High	18

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Stevens Branch** Reach **M1.01S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 53 ft of intersection of River St and Sherwood Dr. Due East 190**
1.2 Towns: **Berlin, Montpelier**
1.3 Downstream Latitude: **44.24**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **1090**
2.1 Elevation Downstream: **530**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6833** feet. **1.29** Miles.
2.3 Valley Slope: **8.20** %
2.4.Channel Length: **7346** feet. **1.39** Miles.
2.5 Channel Slope: **7.62** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **94.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**D**	**62.0** %
Flooding:	**None/Rare**	**95.0** %
Water Table Deep:	**6.0**	**46.0** %
Water Table Shallow:	**0.0**	**44.0** %
Erodibility:	**Very Severe**	**94.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **55.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**2801**	**1570**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1011** **13 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**1081**	ft. **350**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	1 Low	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.02**
Topo Maps: **Barre West**
Date Last Edited: **Thu, August 21, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 1.5 mile from the Pioneer/River Rd. intersection in Montpelier**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **544**
2.1 Elevation Downstream: **528**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8576** feet. **1.62** Miles.
2.3 Valley Slope: **0.19** %
2.4.Channel Length: **9624** feet. **1.82** Miles.
2.5 Channel Slope: **0.17** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **114** Square Miles
2.8 Channel Width: **105** feet.
2.9 Valley Width: **743** feet.
2.10 Confinement Ratio: **7**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Plane Bed**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Rip rap

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**26-50**
Sub-dominant:	**26-50**	**0-25**
Length w/ less than 25 ft.:	**3368**	**2887**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **13** %
5.3 Bank Armoring: **3501.0** **36 %**

	Left	Right
5.4 Channel Straightening:	**2744.0**	**28 %**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **4922.0**ft. **51 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**1885.0** ft.	**7080.0** ft.

6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **None**
6.5 Meander Width: **260.0** Ratio: **2.5**
6.6 Wavelength: **11.2** Ratio: **0.1**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **High (>15 ft.)**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	2 High	2 High	0 N.S.	2 High	2 High	1 Low	0 N.S.	2 High	2 High	1 Low	1 Low	18

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 2 to Stevens** Reach **M1.02S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **At the intesection of Route 302 and Overlook Dr go south east 1019 Ft**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **750**
2.1 Elevation Downstream: **560**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5460** feet. **1.03** Miles.
2.3 Valley Slope: **3.48** %
2.4.Channel Length: **5914** feet. **1.12** Miles.
2.5 Channel Slope: **3.21** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact** **66.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**A**	**43.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**76.0**	%
Water Table Shallow:	**6.0**	**76.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **70.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **88.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**377**	**654**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1603** **27 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 2 to Stevens** Reach **M1.02S2.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **755 ft south of the intersection of Route 302 and Overlook Dr. The**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **980**
2.1 Elevation Downstream: **540**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6400** feet. **1.21** Miles.
2.3 Valley Slope: **6.88** %
2.4.Channel Length: **6922** feet. **1.31** Miles.
2.5 Channel Slope: **6.36** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **73.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**D**	**48.0** %
Flooding:	**None/Rare**	**86.0** %
Water Table Deep:	**6.0**	**55.0** %
Water Table Shallow:	**6.0**	**29.0** %
Erodibility:	**Severe**	**73.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **38.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **35.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**3476**	**3484**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **9** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2979** **43 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**2307** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 3 to Reach 2 to Stevens** Reach **M1.02S3.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **At the point where River Run Manor Rd Y's go south west 188ft to the**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.22**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1000**
2.1 Elevation Downstream: **550**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5360** feet. **1.02** Miles.
2.3 Valley Slope: **8.40** %
2.4.Channel Length: **5836** feet. **1.11** Miles.
2.5 Channel Slope: **7.71** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**92.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**92.0** %
Water Table Shallow:	**1.0**	**92.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **50.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **44.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**799**	**629**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **295** **5 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 3 to Reach 2 to Stevens** Reach **M1.02S3.02**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.02S3.02 X= 496249.421 meters Y= 189334.022 meters**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **1160**
2.1 Elevation Downstream: **1000**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5520** feet. **1.05** Miles.
2.3 Valley Slope: **2.90** %
2.4.Channel Length: **6632** feet. **1.26** Miles.
2.5 Channel Slope: **2.41** %
2.6 Sinuosity: **1.20**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **14** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **77.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**D**	**77.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**1.5**	**98.0**	%
Water Table Shallow:	**0.0**	**98.0**	%
Erodibility:	**Very Severe**	**77.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **48.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **33.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**2127**	**2390**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **496** **7 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**0.0** ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **36.0** Ratio: **2.6**
6.6 Wavelength: **63.0** Ratio: **4.5**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	13

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 3 to Reach 2 to Stevens** Reach **M1.02S3.03**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Airport Rd and Scott Hill Rd go west 450ft on**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **1400**
2.1 Elevation Downstream: **1160**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5530** feet. **1.05** Miles.
2.3 Valley Slope: **4.34** %
2.4.Channel Length: **5910** feet. **1.12** Miles.
2.5 Channel Slope: **4.06** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **6** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**

3.5 Soils

Hydrologic Group:	**D**	**100.**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**1.5**	**51.0**	%
Water Table Shallow:	**0.0**	**51.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **83.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **84.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**1058**	**1092**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1407** **23 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.03**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **1.55 miles south of Berlin State St./Route 302 intersection towards**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **554**
2.1 Elevation Downstream: **544**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2379** feet. **0.45** Miles.
2.3 Valley Slope: **0.42** %
2.4.Channel Length: **2490** feet. **0.47** Miles.
2.5 Channel Slope: **0.40** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **97** Square Miles
2.8 Channel Width: **98** feet.
2.9 Valley Width: **317** feet.
2.10 Confinement Ratio: **3**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Short reach

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**871**	**373**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **1194.0** **47 %**

	Left	Right
5.4 Channel Straightening:		**0.0**
5.5 Dredging History:	**None**	

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2363.0**ft. **94 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.

6.2 Development: **175.0** ft. **0.0** ft.
6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **None**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: **11.2** Ratio: **0.1**

Step 7. Windshield Survey

7.1 Bank Erosion: **None**
7.2 Bank Height: **High (>15 ft.)**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	2 High	1 Low	1 Low	0 N.S.	0 N.D.	2 High	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.04**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **1.75 miles south of Berlin State St./Route 302 intersection towards**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **588**
2.1 Elevation Downstream: **554**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6627** feet. **1.26** Miles.
2.3 Valley Slope: **0.51** %
2.4.Channel Length: **8800** feet. **1.67** Miles.
2.5 Channel Slope: **0.39** %
2.6 Sinuosity: **1.33**
2.7 Watershed Area: **96** Square Miles
2.8 Channel Width: **98** feet.
2.9 Valley Width: **884** feet.
2.10 Confinement Ratio: **9**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Sharp

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**0-25**
Sub-dominant:	**>100**	**26-50**
Length w/ less than 25 ft.:	**10**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **972.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **None**
6.5 Meander Width: **312.0** Ratio: **3.2**
6.6 Wavelength: **100.0** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	1 Low	0 N.S.	1 Low	2 High	2 High	2 High	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 4 to Stevens** Reach **M1.04S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **At the inersection of Packard St and N Main St go west 58ft. Follow**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **940**
2.1 Elevation Downstream: **540**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6400** feet. **1.21** Miles.
2.3 Valley Slope: **6.25** %
2.4.Channel Length: **6871** feet. **1.30** Miles.
2.5 Channel Slope: **5.82** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **10** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **96.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**72.0** %
Flooding:	**None/Rare**	**97.0** %
Water Table Deep:	**2.0**	**44.0** %
Water Table Shallow:	**1.0**	**44.0** %
Erodibility:	**Very Severe**	**85.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **42.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **37.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**3201**	**3291**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2502** **36 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**596.3** ft.	**656** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 4 to Stevens** Reach **M1.04S2.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Berlin St and S. Vine St. go 500ft down S.**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **930**
2.1 Elevation Downstream: **580**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4600** feet. **0.87** Miles.
2.3 Valley Slope: **7.61** %
2.4.Channel Length: **4712** feet. **0.89** Miles.
2.5 Channel Slope: **7.43** %
2.6 Sinuosity: **1.02**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **7** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **75.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**56.0**	%
Flooding:	**None/Rare**	**88.0**	%
Water Table Deep:	**2.0**	**65.0**	%
Water Table Shallow:	**1.0**	**54.0**	%
Erodibility:	**Very Severe**	**87.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **80.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**51-100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**3719**	**3363**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **11** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **3731** **79 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**572**	ft. **1709**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bridge**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.05**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Located in downtown Barre at the intersection of Blackwell and Main**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **597**
2.1 Elevation Downstream: **588**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3968** feet. **0.75** Miles.
2.3 Valley Slope: **0.23** %
2.4.Channel Length: **4529** feet. **0.86** Miles.
2.5 Channel Slope: **0.20** %
2.6 Sinuosity: **1.14**
2.7 Watershed Area: **86** Square Miles
2.8 Channel Width: **93** feet.
2.9 Valley Width: **826** feet.
2.10 Confinement Ratio: **9**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **Yes**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils

Hydrologic Group:	%
Flooding:	%
Water Table Deep:	%
Water Table Shallow:	%
Erodibility: **slight**	%

7.4 Comments:

Rip rap

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**0-25**
Sub-dominant:	**26-50**	**26-50**
Length w/ less than 25 ft.:	**4076**	**3170**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **48** %
5.3 Bank Armoring: **692.0** **15 %**

	Left	Right
5.4 Channel Straightening:	**3013.0**	**66 %**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **4834.0** ft. **106 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**215.0** ft.	**3276.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **94.4** Ratio: **1.0**
6.6 Wavelength: **8.33** Ratio: **0.1**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **High (>15 ft.)**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	2 High	1 Low	2 High	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	1 Low	0 N.S.	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 5 to Stevens** Reach **M1.05S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of River St and and Granite St go South down**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **920**
2.1 Elevation Downstream: **590**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4165** feet. **0.79** Miles.
2.3 Valley Slope: **7.92** %
2.4.Channel Length: **4418** feet. **0.84** Miles.
2.5 Channel Slope: **7.47** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **7** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **74.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**39.0** %
Flooding:	**None/Rare**	**97.0** %
Water Table Deep:	**6.0**	**87.0** %
Water Table Shallow:	**6.0**	**85.0** %
Erodibility:	**Very Severe**	**96.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **29.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **38.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**2202**	**567**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1150** **26 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**143**	ft. **98**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	1 Low	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 5 to Stevens** Reach **M1.05S2.01**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **from the intersection of Church St and Metro Way go west 43ft to the**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **1040**
2.1 Elevation Downstream: **600**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9600** feet. **1.82** Miles.
2.3 Valley Slope: **4.58** %
2.4.Channel Length: **10897** feet. **2.06** Miles.
2.5 Channel Slope: **4.04** %
2.6 Sinuosity: **1.14**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **74.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**36.0**	%
Flooding:	**None/Rare**	**87.0**	%
Water Table Deep:	**6.0**	**59.0**	%
Water Table Shallow:	**6.0**	**47.0**	%
Erodibility:	**Very Severe**	**87.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **43.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **62.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**26-50**	**>100**
Length w/ less than 25 ft.:	**2479**	**2988**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **14** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **3218** **29 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**706**	ft. **3366**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bridge**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 2 to Reach 5 to Stevens** Reach **M1.05S2.01S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Eastern Av and Maple Grove St go 170 ft**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1170**
2.1 Elevation Downstream: **640**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8260** feet. **1.56** Miles.
2.3 Valley Slope: **6.42** %
2.4.Channel Length: **9090** feet. **1.72** Miles.
2.5 Channel Slope: **5.83** %
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **98.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**52.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**47.0** %
Water Table Shallow:	**6.0**	**47.0** %
Erodibility:	**Very Severe**	**78.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **45.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **49.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**1153**	**1052**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**1245**	ft. **277.2**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.06**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **In downtown Barre 768 ft. south of the intersection of Main and**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **603**
2.1 Elevation Downstream: **597**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1692** feet. **0.32** Miles.
2.3 Valley Slope: **0.35** %
2.4.Channel Length: **1693** feet. **0.32** Miles.
2.5 Channel Slope: **0.35** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **83** Square Miles
2.8 Channel Width: **92** feet.
2.9 Valley Width: **424** feet.
2.10 Confinement Ratio: **5**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Plane Bed**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Flat**

3.5 Soils

Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**26-50**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**507**	**507**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Irrigation**
Type:
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**869.0** ft.	**516.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **130.0** Ratio: **1.4**
6.6 Wavelength: **92.9** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **High (>15 ft.)**
7.3 Ice/Debris Jam Potential: **Debris**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	2 High	2 High	1 Low	1 Low	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.07**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.07 off from S. Main St .023 miles from the intersection of Hill St,**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **640**
2.1 Elevation Downstream: **610**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1770** feet. **0.34** Miles.
2.3 Valley Slope: **1.69** %
2.4.Channel Length: **2164** feet. **0.41** Miles.
2.5 Channel Slope: **1.39** %
2.6 Sinuosity: **1.22**
2.7 Watershed Area: **35** Square Miles
2.8 Channel Width: **62** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Glacial Lake** **56.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**B**	**56.0** %
Flooding:	**None/Rare**	**57.0** %
Water Table Deep:	**6.0**	**100.** %
Water Table Shallow:	**6.0**	**57.0** %
Erodibility:	**Severe**	**57.0** %

7.4 Comments:

Reach is to strait to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **47.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**>100**	**0-25**
Length w/ less than 25 ft.:	**165**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1112.7** ft. **51 %**

	One Side	Both Sides
Road:	**995** ft.	**117** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**212** ft.	**749** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.08**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.08 off from S. Main St. At intersection of S. Main St and Circle St**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **655**
2.1 Elevation Downstream: **640**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2400** feet. **0.45** Miles.
2.3 Valley Slope: **0.63** %
2.4.Channel Length: **3242** feet. **0.61** Miles.
2.5 Channel Slope: **0.46** %
2.6 Sinuosity: **1.35**
2.7 Watershed Area: **35** Square Miles
2.8 Channel Width: **62** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.: **Glacial Lake 53.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**B**	**53.0** %
Flooding:	**None/Rare**	**69.0** %
Water Table Deep:	**6.0**	**42.0** %
Water Table Shallow:	**6.0**	**42.0** %
Erodibility:	**Severe**	**68.0** %

7.4 Comments:

Reach is to strait to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **75.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**0-25**
Sub-dominant:	**51-100**	**0-25**
Length w/ less than 25 ft.:	**165**	**500**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **513** ft. **15 %**

	One Side	Both Sides
Road:	**415** ft.	**98** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**798** ft.	**610** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.09**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.09- At 0.0760 miles south of interestion of Parkside Terrace and S.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **700**
2.1 Elevation Downstream: **655**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1327** feet. **0.25** Miles.
2.3 Valley Slope: **3.39** %
2.4.Channel Length: **1441** feet. **0.27** Miles.
2.5 Channel Slope: **3.12** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **34** Square Miles
2.8 Channel Width: **62** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Bedrock**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Till** **68.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**84.0** %
Flooding:	**None/Rare**	**83.0** %
Water Table Deep:	**6.0**	**83.0** %
Water Table Shallow:	**6.0**	**83.0** %
Erodibility:	**Very Severe**	**79.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **76.0** %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **3** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **795** **55 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **284** ft. **19 %**

	One Side	Both Sides
Road:	**222** ft.	**61** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**303** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	2 High	1 Low	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 9 to Stevens** Reach **M1.09S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Bridge St and S Barre Rd go 634 ft down**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **760**
2.1 Elevation Downstream: **700**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1584** feet. **0.30** Miles.
2.3 Valley Slope: **3.79** %
2.4.Channel Length: **1709** feet. **0.32** Miles.
2.5 Channel Slope: **3.51** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: **723** feet.
2.10 Confinement Ratio: **61**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **Yes**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact 50.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**A**	**50.0**	%
Flooding:	**None/Rare**	**78.0**	%
Water Table Deep:	**6.0**	**50.0**	%
Water Table Shallow:	**6.0**	**50.0**	%
Erodibility:	**Moderate**	**27.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 49.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban 99.0** %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**26-50**	**0-25**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**747**	**606**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **2** %
5.3 Bank Armoring: **18 %**
Left **132** Right **189**
5.4 Channel Straightening: **1263** **73 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **93** ft. **5 %**

	One Side	Both Sides	
Road:	**0.0** ft.	**93**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**99** ft.	**456**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **11.5** Ratio: **1.0**
6.6 Wavelength: **11.5** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 9 to Stevens** Reach **M1.09S1.02**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Sterling Hill Rd and Howard St go 192 ft**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **1120**
2.1 Elevation Downstream: **760**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4418** feet. **0.84** Miles.
2.3 Valley Slope: **8.15** %
2.4.Channel Length: **4958** feet. **0.94** Miles.
2.5 Channel Slope: **7.26** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **11** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **97.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**97.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**64.0** %
Water Table Shallow:	**1.0**	**64.0** %
Erodibility:	**Very Severe**	**98.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **42.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**>100**	**0-25**
Length w/ less than 25 ft.:	**363**	**1181**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **1** %
5.3 Bank Armoring: **7 %**
Left **52** Right **305**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2425** ft. **48 %**

	One Side	Both Sides
Road:	**2193** ft.	**232** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**439** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **543.47 ft.**
7.2 Bank Height: **4.42 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	2 High	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.10**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.10 at intersection of Bridge St and Barre go NW along road till you**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **715**
2.1 Elevation Downstream: **700**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5240** feet. **0.99** Miles.
2.3 Valley Slope: **0.29** %
2.4.Channel Length: **7264** feet. **1.38** Miles.
2.5 Channel Slope: **0.21** %
2.6 Sinuosity: **1.39**
2.7 Watershed Area: **33** Square Miles
2.8 Channel Width: **40** feet.
2.9 Valley Width: **750** feet.
2.10 Confinement Ratio: **19**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **69.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**B**	**51.0** %
Flooding:	**Frequent**	**69.0** %
Water Table Deep:	**3.0**	**49.0** %
Water Table Shallow:	**1.5**	**49.0** %
Erodibility:	**slight**	**2.0** %

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width (segment B) due to E reference stream type. Possibly widened.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **58.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **65.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**2294**	**3117**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Small Withdrawal**
Use: **Other**
5.2 Bridges and Culverts: **4** **3** %
5.3 Bank Armoring: **21 %**
Left **663** Right **896**
5.4 Channel Straightening: **2356** **32 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2971** ft. **40 %**

	One Side	Both Sides
Road:	**2971** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**3712** ft.	**249** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **116.0** Ratio: **2.9**
6.6 Wavelength: **253.0** Ratio: **6.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **2,590.64 ft.**
7.2 Bank Height: **4.45 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	1 Low	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	1 Low	0 N.S.	1 Low	21

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 10 to Stevens** Reach **M1.10S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.10S1.01 X= 499354.706 meteres Y= 186231.408 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **735**
2.1 Elevation Downstream: **710**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1419** feet. **0.27** Miles.
2.3 Valley Slope: **1.76** %
2.4.Channel Length: **2055** feet. **0.39** Miles.
2.5 Channel Slope: **1.22** %
2.6 Sinuosity: **1.45**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **20** feet.
2.9 Valley Width: **424** feet.
2.10 Confinement Ratio: **21**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **77.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**83.0**	%
Flooding:	**Frequent**	**77.0**	%
Water Table Deep:	**1.5**	**88.0**	%
Water Table Shallow:	**0.0**	**88.0**	%
Erodibility:	**slight**	**22.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **43.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **21.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**26-50**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**1428**	**498**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **40.0** Ratio: **2.0**
6.6 Wavelength: **95.0** Ratio: **4.8**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 1 to Reach 10 to Stevens** Reach **M1.10S1.01S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.10S1.01S1.01 X= 498975.523 meters Y= 186241.164 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **1020**
2.1 Elevation Downstream: **735**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5084** feet. **0.96** Miles.
2.3 Valley Slope: **5.61** %
2.4.Channel Length: **5443** feet. **1.03** Miles.
2.5 Channel Slope: **5.24** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **11** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope: **a**
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**93.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**93.0** %
Water Table Shallow:	**0.0**	**93.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Field** **36.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Crop** **38.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**3401**	**2115**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **174** **3 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **109** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**109** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 1 to Reach 10 to Stevens** Reach **M1.10S1.01S1.02**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **---**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **1180**
2.1 Elevation Downstream: **1020**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4562** feet. **0.86** Miles.
2.3 Valley Slope: **3.51** %
2.4.Channel Length: **4978** feet. **0.94** Miles.
2.5 Channel Slope: **3.21** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**D**	**76.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**74.0** %
Water Table Shallow:	**0.0**	**74.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Field** **29.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Field** **40.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**51-100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**3739**	**3002**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **108** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**108** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 10 to Stevens** Reach **M1.10S1.02**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.10S1.02 X= 498975.523 meters Y=186234.660 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **1000**
2.1 Elevation Downstream: **735**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5879** feet. **1.11** Miles.
2.3 Valley Slope: **4.51** %
2.4.Channel Length: **6115** feet. **1.16** Miles.
2.5 Channel Slope: **4.33** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **17** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**86.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**86.0** %
Water Table Shallow:	**0.0**	**86.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **42.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**709**	**875**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1462** **23 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 10 to Stevens** Reach **M1.10S1.03**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Lower Usle Rd and Miller Rd go 314 ft south**
1.2 Towns: **Barre Town, Berlin**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1460**
2.1 Elevation Downstream: **1000**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **10800** feet. **2.05** Miles.
2.3 Valley Slope: **4.26** %
2.4.Channel Length: **11272** feet. **2.13** Miles.
2.5 Channel Slope: **4.08** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**D**	**99.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**61.0** %
Water Table Shallow:	**6.0**	**61.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **63.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **3 %**
Left **199** Right **188**
5.4 Channel Straightening: **256** **2 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **57** ft. **0 %**

	One Side	Both Sides
Road:	**0.0** ft.	**57** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	3

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.11**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.364 miles south from the intersection of Bridge St and S Barre**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **730**
2.1 Elevation Downstream: **715**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5136** feet. **0.97** Miles.
2.3 Valley Slope: **0.29** %
2.4.Channel Length: **6410** feet. **1.21** Miles.
2.5 Channel Slope: **0.23** %
2.6 Sinuosity: **1.25**
2.7 Watershed Area: **29** Square Miles
2.8 Channel Width: **41** feet.
2.9 Valley Width: **1,040** feet.
2.10 Confinement Ratio: **25**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **85.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**57.0** %
Flooding:	**Frequent**	**85.0** %
Water Table Deep:	**1.5**	**60.0** %
Water Table Shallow:	**0.0**	**57.0** %
Erodibility:	**slight**	**3.0** %

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Crop** **24.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**3166**	**3501**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Small Withdrawal**
Use: **Other**
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **54 %**
Left **1434** Right **2071**
5.4 Channel Straightening: **3617** **56 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1020** ft. **15 %**

	One Side	Both Sides
Road:	**1020** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**2048** ft.	**0.0** ft.

6.3 Channel Bars: **Side**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **71.0** Ratio: **1.7**
6.6 Wavelength: **241.0** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **2,242.78 ft.**
7.2 Bank Height: **5.51 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width (segment C) due to E reference stream type. Possibly widened.

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	1 Low	0 N.S.	2 High	2 High	0 N.S.	1 Low	2 High	1 Low	1 Low	2 High	2 High	0 N.S.	1 Low	21

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 11 to Stevens** Reach **M1.11S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Jackson St and South Barre Rt go 466ft**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **760**
2.1 Elevation Downstream: **730**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1104** feet. **0.21** Miles.
2.3 Valley Slope: **2.72** %
2.4.Channel Length: **1150** feet. **0.22** Miles.
2.5 Channel Slope: **2.61** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **19** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact** **67.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Flat**
3.5 Soils

Hydrologic Group:	**B**	**76.0** %
Flooding:	**None/Rare**	**69.0** %
Water Table Deep:	**2.5**	**48.0** %
Water Table Shallow:	**1.5**	**74.0** %
Erodibility:	**slight**	**2.0** %

7.4 Comments:

Stream is not visible to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **44.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **48.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**26-50**	**51-100**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**497**	**743**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **2** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **508** **44 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **73** ft. **6 %**

	One Side	Both Sides	
Road:	**0.0**	ft. **73**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**155**	ft. **182**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	0 N.S.	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 11 to Stevens** Reach **M1.11S1.02**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Jackson St and S Barre Rd go 466 ft south .**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **1220**
2.1 Elevation Downstream: **760**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5400** feet. **1.02** Miles.
2.3 Valley Slope: **8.52** %
2.4.Channel Length: **5678** feet. **1.08** Miles.
2.5 Channel Slope: **8.10** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **19** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Cascade**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Till** **98.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**C**	**70.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**99.0** %
Water Table Shallow:	**6.0**	**99.0** %
Erodibility:	**Very Severe**	**98.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **45.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2199** ft. **38 %**

	One Side	Both Sides
Road:	**1857** ft.	**342** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 11 to Stevens** Reach **M1.11S1.03**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Graniteville Rd and Middle Rd go south 112**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1290**
2.1 Elevation Downstream: **1220**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3873** feet. **0.73** Miles.
2.3 Valley Slope: **1.81** %
2.4.Channel Length: **3926** feet. **0.74** Miles.
2.5 Channel Slope: **1.78** %
2.6 Sinuosity: **1.01**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **17** feet.
2.9 Valley Width: **370** feet.
2.10 Confinement Ratio: **22**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**D**	**71.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**40.0** %
Water Table Shallow:	**0.0**	**40.0** %
Erodibility:	**Severe**	**67.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **48.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **47.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**515**	**461**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **1** %
5.3 Bank Armoring: **1 %**
Left **26** Right **25**
5.4 Channel Straightening: **1486** **37 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **725** ft. **18 %**

	One Side	Both Sides	
Road:	**466.4** ft.	**259**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**179** ft.	**388**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **17.0** Ratio: **1.0**
6.6 Wavelength: **17.0** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	1 Low	1 Low	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	15

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 1 to Reach 11 to Stevens** Reach **M1.11S1.03S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.11S1.03S1.01 X= 500751.114 Meters Y= 183765.743 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1290**
2.1 Elevation Downstream: **1230**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2681** feet. **0.51** Miles.
2.3 Valley Slope: **2.24** %
2.4.Channel Length: **2721** feet. **0.52** Miles.
2.5 Channel Slope: **2.21** %
2.6 Sinuosity: **1.01**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: **298** feet.
2.10 Confinement Ratio: **37**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**D**	**77.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**1.5**	**47.0**	%
Water Table Shallow:	**0.0**	**47.0**	%
Erodibility:	**Severe**	**70.0**	%

7.4 Comments:

Stream is not visible to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **49.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **67.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**26-50**
Length w/ less than 25 ft.:	**350**	**267**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **5 %**
Left **71** Right **69**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **80** ft. **2 %**

	One Side	Both Sides	
Road:	**0.0** ft.	**80**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**543** ft.	**197**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **255.73 ft.**
7.2 Bank Height: **1.04 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 2 to Reach 11 to Stevens** Reach **M1.11S2.01**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Morin Rd and S. Barre Rd go 140 ft south on**
1.2 Towns: **Barre Town, Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **1320**
2.1 Elevation Downstream: **735**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7200** feet. **1.36** Miles.
2.3 Valley Slope: **8.13** %
2.4.Channel Length: **7622** feet. **1.44** Miles.
2.5 Channel Slope: **7.68** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Cascade**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **82.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**46.0** %
Flooding:	**None/Rare**	**99.0** %
Water Table Deep:	**6.0**	**37.0** %
Water Table Shallow:	**1.0**	**36.0** %
Erodibility:	**Very Severe**	**89.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **63.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**1019**	**2056**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **1 %**
Left **65** Right **65**
5.4 Channel Straightening: **464** **6 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **222** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**222** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**112** ft.	**425** ft.

6.3 Channel Bars: **Side**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **257.53 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	1 Low	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.12**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.12 is 0.024 miles South of the intersectin of Morin Rd and S Barre**
1.2 Towns: **Barre Town, Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **740**
2.1 Elevation Downstream: **730**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2905** feet. **0.55** Miles.
2.3 Valley Slope: **0.34** %
2.4.Channel Length: **3125** feet. **0.59** Miles.
2.5 Channel Slope: **0.32** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **24** Square Miles
2.8 Channel Width: **40** feet.
2.9 Valley Width: **505** feet.
2.10 Confinement Ratio: **12**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **67.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Flat**
3.5 Soils

Hydrologic Group:	**B**	**65.0** %
Flooding:	**Frequent**	**67.0** %
Water Table Deep:	**3.0**	**61.0** %
Water Table Shallow:	**1.5**	**62.0** %
Erodibility:	**slight**	**14.0** %

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width (segment A) due to E reference stream type. Possibly widened.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **36.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**26-50**	**26-50**
Length w/ less than 25 ft.:	**1134**	**2236**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **3** %
5.3 Bank Armoring: **26 %**
Left **113** Right **729**
5.4 Channel Straightening: **1608** **51 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2015** ft. **64 %**

	One Side	Both Sides
Road:	**2015** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**781** ft.	**0.0** ft.

6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **99.0** Ratio: **2.5**
6.6 Wavelength: **263.0** Ratio: **6.5**

Step 7. Windshield Survey

7.1 Bank Erosion: **938.37 ft.**
7.2 Bank Height: **5.45 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	1 Low	1 Low	2 High	1 Low	0 N.S.	1 Low	20

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.13**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.13 is 0.014 miles South of the intersection of Farnham Rd and**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **750**
2.1 Elevation Downstream: **740**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2315** feet. **0.44** Miles.
2.3 Valley Slope: **0.43** %
2.4.Channel Length: **2714** feet. **0.51** Miles.
2.5 Channel Slope: **0.37** %
2.6 Sinuosity: **1.17**
2.7 Watershed Area: **23** Square Miles
2.8 Channel Width: **47** feet.
2.9 Valley Width: **622** feet.
2.10 Confinement Ratio: **13**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact** **54.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**A**	**54.0**	%
Flooding:	**None/Rare**	**69.0**	%
Water Table Deep:	**6.0**	**86.0**	%
Water Table Shallow:	**6.0**	**57.0**	%
Erodibility:	**Moderate**	**42.0**	%

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width due to E reference stream type. Possibly widened.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **27.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**0**	**722**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **6 %**
Left **0.0** Right **167.2**
5.4 Channel Straightening: **1255** **46 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1004** ft. **36 %**

	One Side	Both Sides	
Road:	**1004** ft.	**0.0**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**631** ft.	**0.0**	ft.

6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **146.0** Ratio: **3.1**
6.6 Wavelength: **278.0** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **924.63 ft.**
7.2 Bank Height: **4.52 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	2 High	2 High	1 Low	1 Low	1 Low	2 High	0 N.S.	0 N.S.	18

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.14**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.14 is south of the intersection of Hulbert Rd and Route 14 South.**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **755**
2.1 Elevation Downstream: **750**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1427** feet. **0.27** Miles.
2.3 Valley Slope: **0.35** %
2.4.Channel Length: **1812** feet. **0.34** Miles.
2.5 Channel Slope: **0.28** %
2.6 Sinuosity: **1.27**
2.7 Watershed Area: **18** Square Miles
2.8 Channel Width: **24** feet.
2.9 Valley Width: **542** feet.
2.10 Confinement Ratio: **23**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **65.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**B**	**80.0** %
Flooding:	**Frequent**	**65.0** %
Water Table Deep:	**3.0**	**53.0** %
Water Table Shallow:	**1.5**	**53.0** %
Erodibility:	**Moderate**	**33.0** %

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width due to E reference stream type. Possibly widened.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **42.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**51-100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**616**	**225**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **56 %**
Left **223** Right **791**
5.4 Channel Straightening: **1462** **80 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1281** ft. **70 %**

	One Side	Both Sides
Road:	**883** ft.	**344** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**54** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**559** ft.	**45** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **46.4** Ratio: **1.9**
6.6 Wavelength: **46.4** Ratio: **1.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **115.97 ft.**
7.2 Bank Height: **4.18 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	1 Low	0 N.S.	2 High	2 High	0 N.S.	1 Low	20

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Cold Spring Brook** Reach **M1.14S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Hulbert Rd and Route 14 S. Go south 260 ft**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1140**
2.1 Elevation Downstream: **750**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5390** feet. **1.02** Miles.
2.3 Valley Slope: **7.24** %
2.4.Channel Length: **5534** feet. **1.05** Miles.
2.5 Channel Slope: **7.05** %
2.6 Sinuosity: **1.03**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **78.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**48.0**	%
Flooding:	**None/Rare**	**98.0**	%
Water Table Deep:	**2.0**	**36.0**	%
Water Table Shallow:	**1.0**	**36.0**	%
Erodibility:	**Very Severe**	**97.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **62.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **38.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**352**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **433** **7 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **111** ft. **2 %**

	One Side		Both Sides	
Road:	**0.0**	ft.	**111**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**155**	ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Cold Spring Brook** Reach **M1.14S1.02**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **1461 ft North of the intersection of Williamstown Rd and McGlynn Rd**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **1380**
2.1 Elevation Downstream: **1140**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5277** feet. **1.00** Miles.
2.3 Valley Slope: **4.55** %
2.4.Channel Length: **5680** feet. **1.08** Miles.
2.5 Channel Slope: **4.23** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**51.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**1.5**	**46.0**	%
Water Table Shallow:	**0.0**	**46.0**	%
Erodibility:	**Very Severe**	**94.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **68.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **47.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**411**	**387**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **641** **11 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **181** ft. **3 %**

	One Side	Both Sides
Road:	**0.0** ft.	**181** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.15**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.15 is 0.23 miles North of intersection of Falls Brdige Rd and Route**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **770**
2.1 Elevation Downstream: **755**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3220** feet. **0.61** Miles.
2.3 Valley Slope: **0.47** %
2.4.Channel Length: **4464** feet. **0.85** Miles.
2.5 Channel Slope: **0.34** %
2.6 Sinuosity: **1.39**
2.7 Watershed Area: **16** Square Miles
2.8 Channel Width: **29** feet.
2.9 Valley Width: **987** feet.
2.10 Confinement Ratio: **35**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact 47.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**A**	**46.0** %
Flooding:	**None/Rare**	**64.0** %
Water Table Deep:	**6.0**	**56.0** %
Water Table Shallow:	**6.0**	**56.0** %
Erodibility:	**slight**	**12.0** %

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 56.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban 27.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**26-50**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**1401**	**886**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **25 %**
Left **542** Right **594**
5.4 Channel Straightening: **1650** **36 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **3750** ft. **84 %**

	One Side	Both Sides
Road:	**3389** ft.	**136** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**224** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**1230** ft.	**109** ft.

6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **82.0** Ratio: **2.9**
6.6 Wavelength: **130.0** Ratio: **4.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **1,607.63 ft.**
7.2 Bank Height: **4.13 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

7.4 Comments:

Ph 1 Channel width was updated with phase 2 field measured width (segment A) due to E reference stream type. Possibly widened. Segment B was assigned a subreach (C stream

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	1 Low	2 High	2 High	2 High	0 N.S.	1 Low	22

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.16**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.16 is 0.079 miles from the intersection of brockway hill rd and**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **845**
2.1 Elevation Downstream: **770**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1880** feet. **0.36** Miles.
2.3 Valley Slope: **3.99** %
2.4.Channel Length: **2108** feet. **0.40** Miles.
2.5 Channel Slope: **3.56** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **12** Square Miles
2.8 Channel Width: **40** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Multiple**
3.3 Dominant Geologic Mat.: **Ice-Contact 100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**A**	**100.**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**100.**	%
Water Table Shallow:	**6.0**	**100.**	%
Erodibility:	**Very Severe**	**96.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **36.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**0**	**436**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Small Withdrawal**
Use: **Recreation**
5.2 Bridges and Culverts: **2** **2** %
5.3 Bank Armoring: **23 %**
Left **319** Right **170**
5.4 Channel Straightening: **539** **25 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1183.3**ft. **56 %**

	One Side	Both Sides
Road:	**1116** ft.	**67** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**419** ft.	**213.2** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **110.44 ft.**
7.2 Bank Height: **3.90 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	1 Low	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	17

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.17**
Topo Maps: **BARRE WEST, BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.17 - Is 0.024 miles South of the intersection of Short St and**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **850**
2.1 Elevation Downstream: **845**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1274** feet. **0.24** Miles.
2.3 Valley Slope: **0.39** %
2.4.Channel Length: **1544** feet. **0.29** Miles.
2.5 Channel Slope: **0.32** %
2.6 Sinuosity: **1.21**
2.7 Watershed Area: **12** Square Miles
2.8 Channel Width: **40** feet.
2.9 Valley Width: **394** feet.
2.10 Confinement Ratio: **10**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **54.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**54.0** %
Flooding:	**Frequent**	**54.0** %
Water Table Deep:	**3.0**	**54.0** %
Water Table Shallow:	**1.5**	**54.0** %
Erodibility:	**Moderate**	**34.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **32.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**>100**	**0-25**
Length w/ less than 25 ft.:	**0**	**226**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **694** **44 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**207.2** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **39.6** Ratio: **1.0**
6.6 Wavelength: **39.6** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	1 Low	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	14

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.18**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.18 is 0.0214 miles south of Brockway Rd and the intersection of**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **855**
2.1 Elevation Downstream: **850**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4078** feet. **0.77** Miles.
2.3 Valley Slope: **0.12** %
2.4.Channel Length: **5013** feet. **0.95** Miles.
2.5 Channel Slope: **0.10** %
2.6 Sinuosity: **1.23**
2.7 Watershed Area: **8** Square Miles
2.8 Channel Width: **33** feet.
2.9 Valley Width: **795** feet.
2.10 Confinement Ratio: **24**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **57.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**A**	**39.0** %
Flooding:	**Frequent**	**57.0** %
Water Table Deep:	**6.0**	**42.0** %
Water Table Shallow:	**0.0**	**54.0** %
Erodibility:	**Moderate**	**30.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **35.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**1246**	**3305**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **3648** **72 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **144** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**144** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**690** ft.	**288** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **33.3** Ratio: **1.0**
6.6 Wavelength: **33.3** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	15

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.19**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.19 is 0.041 miles from American Rural Fire Apparatus. It is 0.197**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **890**
2.1 Elevation Downstream: **855**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5286** feet. **1.00** Miles.
2.3 Valley Slope: **0.66** %
2.4.Channel Length: **6572** feet. **1.24** Miles.
2.5 Channel Slope: **0.53** %
2.6 Sinuosity: **1.24**
2.7 Watershed Area: **7** Square Miles
2.8 Channel Width: **30** feet.
2.9 Valley Width: **951** feet.
2.10 Confinement Ratio: **31**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **88.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**83.0**	%
Flooding:	**Frequent**	**88.0**	%
Water Table Deep:	**0.5**	**83.0**	%
Water Table Shallow:	**0.0**	**87.0**	%
Erodibility:	**slight**	**11.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **58.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Wetland**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**3088**	**6366**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2348** **35 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **697** ft. **10 %**

	One Side		Both Sides	
Road:	**549**	ft.	**148**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**362**	ft.	**0.0**	ft.

6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **57.0** Ratio: **1.9**
6.6 Wavelength: **141.0** Ratio: **4.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	1 Low	1 Low	2 High	2 High	2 High	0 N.S.	1 Low	18

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 19 to Stevens** Reach **M1.19S1.01**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Chelsea rd and rt 14 go south 115 ft. Follow**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **880**
2.1 Elevation Downstream: **865**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **629** feet. **0.12** Miles.
2.3 Valley Slope: **2.38** %
2.4.Channel Length: **809** feet. **0.15** Miles.
2.5 Channel Slope: **1.85** %
2.6 Sinuosity: **1.29**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: **311** feet.
2.10 Confinement Ratio: **20**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **80.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**80.0**	%
Flooding:	**Frequent**	**80.0**	%
Water Table Deep:	**1.5**	**80.0**	%
Water Table Shallow:	**0.0**	**80.0**	%
Erodibility:	**slight**	**19.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **40.0** %
Current Sub-Dominant Land Cover: **Wetland**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**26-50**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**809**	**611**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **581** ft. **71 %**

	One Side		Both Sides	
Road:	**525**	ft.	**55**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**52**	ft.	**0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **17.0** Ratio: **1.1**
6.6 Wavelength: **53.0** Ratio: **3.3**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	1 Low	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	15

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 19 to Stevens** Reach **M1.19S1.02**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Chelsea Rd and Rt 14 go south 170ft. From**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1140**
2.1 Elevation Downstream: **880**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3475** feet. **0.66** Miles.
2.3 Valley Slope: **7.48** %
2.4.Channel Length: **3629** feet. **0.69** Miles.
2.5 Channel Slope: **7.16** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**53.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**66.0**	%
Water Table Shallow:	**6.0**	**66.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **30.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**0**	**174**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1321.2** **36 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **996** ft. **27 %**

	One Side	Both Sides	
Road:	**808.1** ft.	**188**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**430** ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	2 High	1 Low	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 19 to Stevens** Reach **M1.19S1.03**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.19S1.03 X= 497591.298 meters Y= 178022.351 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1520**
2.1 Elevation Downstream: **1140**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7270** feet. **1.38** Miles.
2.3 Valley Slope: **5.23** %
2.4.Channel Length: **7766** feet. **1.47** Miles.
2.5 Channel Slope: **4.89** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**81.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**41.0** %
Water Table Shallow:	**6.0**	**41.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **41.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**1101**	**1119**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2075** **26 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1404** ft. **18 %**

	One Side	Both Sides
Road:	**1259** ft.	**144** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **74.50 ft.**
7.2 Bank Height: **20.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 19 to Stevens** Reach **M1.19S2.01**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 1860 ft from the intersection of Rt 14 and Chelsea Rd. West 454**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **895**
2.1 Elevation Downstream: **875**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **790** feet. **0.15** Miles.
2.3 Valley Slope: **2.53** %
2.4.Channel Length: **817** feet. **0.15** Miles.
2.5 Channel Slope: **2.45** %
2.6 Sinuosity: **1.03**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: **198** feet.
2.10 Confinement Ratio: **13**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **60.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**39.0**	%
Flooding:	**Frequent**	**60.0**	%
Water Table Deep:	**3.0**	**30.0**	%
Water Table Shallow:	**1.5**	**30.0**	%
Erodibility:	**Moderate**	**39.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Wetland** **48.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**418**	**418**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **496** **60 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **55** ft. **6 %**

	One Side		Both Sides	
Road:	**0.0**	ft.	**55**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**143**	ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **15.4** Ratio: **1.0**
6.6 Wavelength: **15.4** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	1 Low	0 N.S.	1 Low	2 High	2 High	0 N.S.	0 N.S.	15

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 19 to Stevens** Reach **M1.19S2.02**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 1860 ft from the intersection of Rt 14 and Chelsea Rd. East 340**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1300**
2.1 Elevation Downstream: **895**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4813** feet. **0.91** Miles.
2.3 Valley Slope: **8.41** %
2.4.Channel Length: **5035** feet. **0.95** Miles.
2.5 Channel Slope: **8.04** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**98.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**98.0** %
Water Table Shallow:	**1.0**	**98.0** %
Erodibility:	**Very Severe**	**100.** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**207**	**142**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **783.4** ft. **15 %**

	One Side	Both Sides	
Road:	**522** ft.	**261**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**0.0** ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 19 to Stevens** Reach **M1.19S2.03**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.19S2.03 X= 497791.671 meters Y=177177.981 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.09**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1530**
2.1 Elevation Downstream: **1300**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5837** feet. **1.11** Miles.
2.3 Valley Slope: **3.94** %
2.4.Channel Length: **6334** feet. **1.20** Miles.
2.5 Channel Slope: **3.63** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **14** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**65.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**55.0** %
Water Table Shallow:	**6.0**	**55.0** %
Erodibility:	**Very Severe**	**89.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**998**	**1006**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **725** ft. **11 %**

	One Side	Both Sides	
Road:	**602**	ft. **123**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Stevens Branch** Reach **M1.22**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **M1.22 is 0.0086 miles South of the intersection of Winchester Hill Rd**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.09**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **1670**
2.1 Elevation Downstream: **920**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9000** feet. **1.70** Miles.
2.3 Valley Slope: **8.33** %
2.4.Channel Length: **10635** feet. **2.01** Miles.
2.5 Channel Slope: **7.05** %
2.6 Sinuosity: **1.18**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**92.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**52.0** %
Water Table Shallow:	**6.0**	**52.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **49.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **31.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**2352**	**2526**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1015** **9 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2689** ft. **25 %**

	One Side	Both Sides
Road:	**2458** ft.	**230** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**1100** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Avulsion**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	1 Low	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.01**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.05 miles east of the partridge/cedar intersection**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **572**
2.1 Elevation Downstream: **528**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1098** feet. **0.21** Miles.
2.3 Valley Slope: **4.01** %
2.4.Channel Length: **1098** feet. **0.21** Miles.
2.5 Channel Slope: **4.01** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **13** Square Miles
2.8 Channel Width: **41** feet.
2.9 Valley Width: **92** feet.
2.10 Confinement Ratio: **2**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material:

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**576**	**704**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **866.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **Dredging**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **37.0** Ratio: **0.9**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.D.	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.02**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.06 miles southwest of the intersection of green mountain rd and**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **857**
2.1 Elevation Downstream: **572**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2598** feet. **0.49** Miles.
2.3 Valley Slope: **10.97** %
2.4.Channel Length: **2598** feet. **0.49** Miles.
2.5 Channel Slope: **10.97** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **13** Square Miles
2.8 Channel Width: **41** feet.
2.9 Valley Width: **72** feet.
2.10 Confinement Ratio: **2**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material:

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**129**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Impoundment**
Type:
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**0.0** ft.	**316.0** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **None**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height:
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	0 N.S.	0 N.D.	0 N.D.	0 N.S.	0 N.S.	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.03**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.07 miles east of Paine Trnpk rd. at 0.33 miles south of spruce and**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **875**
2.1 Elevation Downstream: **857**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1620** feet. **0.31** Miles.
2.3 Valley Slope: **1.11** %
2.4.Channel Length: **2083** feet. **0.39** Miles.
2.5 Channel Slope: **0.86** %
2.6 Sinuosity: **1.29**
2.7 Watershed Area: **13** Square Miles
2.8 Channel Width: **41** feet.
2.9 Valley Width: **488** feet.
2.10 Confinement Ratio: **12**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Plane Bed**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Water treatment facility with corresponding rip rap

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**>100**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**2496**	**643**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Impoundment**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **None**
6.5 Meander Width: **104.0** Ratio: **2.6**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	1 Low	0 N.S.	2 High	0 N.D.	0 N.S.	1 Low	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.04**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.09 miles northeast of the Paine Trnpk rd and Spruce Rd**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.22**
1.3 Downstream Longitude: **-72.57**

Step 2. Stream Type

2.1 Elevation Upstream: **958**
2.1 Elevation Downstream: **875**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6694** feet. **1.27** Miles.
2.3 Valley Slope: **1.24** %
2.4.Channel Length: **8222** feet. **1.56** Miles.
2.5 Channel Slope: **1.01** %
2.6 Sinuosity: **1.23**
2.7 Watershed Area: **13** Square Miles
2.8 Channel Width: **40** feet.
2.9 Valley Width: **727** feet.
2.10 Confinement Ratio: **18**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Beaver dam above culvert under Berlin Street

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**26-50**	**>100**
Length w/ less than 25 ft.:	**5130**	**5171**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **224.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **Dredging**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **234.0** Ratio: **5.8**
6.6 Wavelength: **8.48** Ratio: **0.2**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 Unk.	0 N.S.	2 High	1 Low	0 N.S.	2 High	1 Low	2 High	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 14 to Pond Brook** Reach **T1.04S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **From the intersection of Stewart Rd,Pain Turnpike N., and Fisher road**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.22**
1.3 Downstream Longitude: **-72.57**

Step 2. Stream Type

2.1 Elevation Upstream: **1290**
2.1 Elevation Downstream: **910**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **12052** feet. **2.28** Miles.
2.3 Valley Slope: **3.15** %
2.4.Channel Length: **13452** feet. **2.55** Miles.
2.5 Channel Slope: **2.82** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **96.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**60.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**46.0** %
Water Table Shallow:	**0.0**	**46.0** %
Erodibility:	**Severe**	**75.0** %

7.4 Comments:

Meanders not visible to measure.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **41.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**4672**	**4274**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **5083** **37 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0**	ft. **0.0** ft.
Railroad:	**0.0**	ft. **0.0** ft.
Berm:	**0.0**	ft. **0.0** ft.
Improved Path:	**0.0**	ft. **0.0** ft.
6.2 Development:	**0.0**	ft. **0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	0 N.D.	0 N.D.	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.06**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.03 miles north of Mirror Lake Rd. at 0.19 miles east of Mirror Lake**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.59**

Step 2. Stream Type

2.1 Elevation Upstream: **1008**
2.1 Elevation Downstream: **971**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5699** feet. **1.08** Miles.
2.3 Valley Slope: **0.65** %
2.4.Channel Length: **7001** feet. **1.33** Miles.
2.5 Channel Slope: **0.53** %
2.6 Sinuosity: **1.23**
2.7 Watershed Area: **5** Square Miles
2.8 Channel Width: **28** feet.
2.9 Valley Width: **1,065** feet.
2.10 Confinement Ratio: **39**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Marsh land

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **3** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **432.0** ft. **6 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **243.0** Ratio: **8.8**
6.6 Wavelength: **12.1** Ratio: **0.4**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **Low (<5 ft.)**
7.3 Ice/Debris Jam Potential: **Culvert**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	0 N.S.	1 Low	2 High	1 Low	1 Low	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.07**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.03 miles west of Paine Trnpk rd at 1.06 miles from the intersection**
1.2 Towns: **Berlin**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.59**

Step 2. Stream Type

2.1 Elevation Upstream: **1092**
2.1 Elevation Downstream: **1008**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3386** feet. **0.64** Miles.
2.3 Valley Slope: **2.48** %
2.4.Channel Length: **4066** feet. **0.77** Miles.
2.5 Channel Slope: **2.07** %
2.6 Sinuosity: **1.20**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **22** feet.
2.9 Valley Width: **482** feet.
2.10 Confinement Ratio: **22**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **Yes**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	%
Flooding:	%
Water Table Deep:	%
Water Table Shallow:	%
Erodibility: **slight**	%

7.4 Comments:

Debri

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **9** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development: **0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **182.0** Ratio: **8.2**
6.6 Wavelength: **13.9** Ratio: **0.6**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **Low (<5 ft.)**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	2 High	1 Low	2 High	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.08**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.05 miles east of Paine Trnpk road at 0.44 miles northeast of Paine**
1.2 Towns: **Northfield**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.59**

Step 2. Stream Type

2.1 Elevation Upstream: **1193**
2.1 Elevation Downstream: **1092**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2685** feet. **0.51** Miles.
2.3 Valley Slope: **3.76** %
2.4.Channel Length: **2685** feet. **0.51** Miles.
2.5 Channel Slope: **3.76** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **20** feet.
2.9 Valley Width: **172** feet.
2.10 Confinement Ratio: **9**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **B**
Bedform: **Bedrock**
Sub-class Slope:
Bed Material: **Bedrock**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.: %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Shallow debri and S shaped turns

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **14** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:	**372.0**	**13 %**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **588.0** ft. **21 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**0.0** ft. **0.0**	ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **52.0** Ratio: **2.6**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **Medium (5 - 15 ft.)**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	2 High	0 N.D.	2 High	2 High	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.09**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.01 miles east of the Berlin Pond rd and Onion River rd intersection**
1.2 Towns: **Northfield**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.60**

Step 2. Stream Type

2.1 Elevation Upstream: **1267**
2.1 Elevation Downstream: **1193**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3625** feet. **0.69** Miles.
2.3 Valley Slope: **2.04** %
2.4.Channel Length: **3626** feet. **0.69** Miles.
2.5 Channel Slope: **2.04** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: **264** feet.
2.10 Confinement Ratio: **14**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**940**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Impoundment**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **122.0** Ratio: **6.6**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.D.	1 Low	1 Low	5

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Pond Brook** Reach **T1.10**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.05 miles west of Berlin Pond rd at 0.67 miles north of Fairway and**
1.2 Towns: **Northfield**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.60**

Step 2. Stream Type

2.1 Elevation Upstream: **1539**
2.1 Elevation Downstream: **1267**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4849** feet. **0.92** Miles.
2.3 Valley Slope: **5.61** %
2.4.Channel Length: **4850** feet. **0.92** Miles.
2.5 Channel Slope: **5.61** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: **295** feet.
2.10 Confinement Ratio: **31**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **B**
Bedform: **Plane Bed**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Two culverts which split the flow

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**26-50**	**0-25**
Length w/ less than 25 ft.:	**0**	**724**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **156.0** Ratio: **16.6**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	0 N.D.	1 Low	1 Low	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.01**
Topo Maps: **Barre West**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Located off of Main St. between the intersections of Ossola/Main and**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.20**
1.3 Downstream Longitude: **-72.51**

Step 2. Stream Type

2.1 Elevation Upstream: **598**
2.1 Elevation Downstream: **589**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2872** feet. **0.54** Miles.
2.3 Valley Slope: **0.31** %
2.4.Channel Length: **2872** feet. **0.54** Miles.
2.5 Channel Slope: **0.31** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **8** Square Miles
2.8 Channel Width: **33** feet.
2.9 Valley Width: **1,174** feet.
2.10 Confinement Ratio: **36**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**26-50**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **1** %
5.3 Bank Armoring: **2685.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **260.0** Ratio: **7.9**
6.6 Wavelength: **28.9** Ratio: **0.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	3

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 1 to Gunners** Reach **T2.01S1.01**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **81 ft south of the intersection of Maple Ave and Brook St. The reach**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **1000**
2.1 Elevation Downstream: **720**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5272** feet. **1.00** Miles.
2.3 Valley Slope: **5.31** %
2.4.Channel Length: **5527** feet. **1.05** Miles.
2.5 Channel Slope: **5.07** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **65.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**55.0** %
Flooding:	**None/Rare**	**97.0** %
Water Table Deep:	**6.0**	**59.0** %
Water Table Shallow:	**6.0**	**57.0** %
Erodibility:	**Very Severe**	**97.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **36.0** %
Current Sub-Dominant Land Cover: **Forest**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **43.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**2289**	**2035**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1597** **28 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**327**	ft. **497**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.02**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Located 0.02 miles east of Farwell Rd. at 0.04 miles North of the**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **632**
2.1 Elevation Downstream: **598**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1904** feet. **0.36** Miles.
2.3 Valley Slope: **1.79** %
2.4.Channel Length: **1905** feet. **0.36** Miles.
2.5 Channel Slope: **1.78** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **8** Square Miles
2.8 Channel Width: **32** feet.
2.9 Valley Width: **80** feet.
2.10 Confinement Ratio: **3**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **C**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

In channel bedrock constraints

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**190**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **317.0** ft. **16 %**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	**0.0** ft. **975.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **52.0** Ratio: **1.6**
6.6 Wavelength: **23.8** Ratio: **0.7**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height: **High (>15 ft.)**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	2 High	2 High	1 Low	2 High	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.03**
Topo Maps: **Barre West**
Date Last Edited: **Mon, August 25, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Located 0.06 miles east of Farwell rd. at 0.24 miles north of the**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.21**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **708**
2.1 Elevation Downstream: **632**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3240** feet. **0.61** Miles.
2.3 Valley Slope: **2.35** %
2.4.Channel Length: **3241** feet. **0.61** Miles.
2.5 Channel Slope: **2.34** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **7** Square Miles
2.8 Channel Width: **32** feet.
2.9 Valley Width: **148** feet.
2.10 Confinement Ratio: **5**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Not Evaluated**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **No Data**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Not evaluated

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**>100**	**26-50**
Length w/ less than 25 ft.:	**324**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left Right
5.4 Channel Straightening: **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.

6.2 Development: **638.0** ft. **0.0** ft.
6.3 Channel Bars: **Point**
6.4 Meander Migration: **None**
6.5 Meander Width: **234.0** Ratio: **7.4**
6.6 Wavelength: **22.4** Ratio: **0.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **Not Evaluated**
7.2 Bank Height: **Not Evaluated**
7.3 Ice/Debris Jam Potential: **Not Evaluated**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	5

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.04**
Topo Maps: **Barre East**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Located 0.08 miles west of Montpelier Rd. at 0.23 miles southwest of**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.22**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1023**
2.1 Elevation Downstream: **708**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **10246** feet. **1.94** Miles.
2.3 Valley Slope: **3.07** %
2.4.Channel Length: **10246** feet. **1.94** Miles.
2.5 Channel Slope: **3.07** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **7** Square Miles
2.8 Channel Width: **31** feet.
2.9 Valley Width: **157** feet.
2.10 Confinement Ratio: **5**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **B**
Bedform: **Plane Bed**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Bedrock noted in channel, shallow, and bend

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**812**	**332**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Impoundment**
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **945.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **Dredging**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **148.0** Ratio: **4.8**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Multiple**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 Unk.	0 N.S.	2 High	1 Low	1 Low	0 N.D.	0 N.S.	1 Low	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Ketchum Brook** Reach **T2.04S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South 95 ft from the intersection of Plainfield Brook Rd and Camire**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.22**
1.3 Downstream Longitude: **-72.48**

Step 2. Stream Type

2.1 Elevation Upstream: **1600**
2.1 Elevation Downstream: **840**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **12060** feet. **2.28** Miles.
2.3 Valley Slope: **6.30** %
2.4.Channel Length: **13118** feet. **2.48** Miles.
2.5 Channel Slope: **5.79** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **95.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**D**	**63.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**67.0** %
Water Table Shallow:	**0.0**	**67.0** %
Erodibility:	**Very Severe**	**94.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **39.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **34.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**2111**	**4054**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **3861** **29 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**68** ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 4 to Gunners** Reach **T2.04S2.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **go 74 ft south from the intersection of Plainfield Brook Rd and TH 23.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1625**
2.1 Elevation Downstream: **940**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9650** feet. **1.83** Miles.
2.3 Valley Slope: **7.10** %
2.4.Channel Length: **10830** feet. **2.05** Miles.
2.5 Channel Slope: **6.33** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **10** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**

3.5 Soils

Hydrologic Group:	**C**	**64.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**57.0** %
Water Table Shallow:	**1.0**	**57.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Crop** **34.0** %
Current Sub-Dominant Land Cover: **Forest**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **46.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**26-50**	**26-50**
Length w/ less than 25 ft.:	**4866**	**4864**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **334** **3 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**157** ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	2 High	0 N/A	0 N/A	0 N.S.	0 N.S.	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 3 to Reach 4 to Gunners** Reach **T2.04S3.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **140ft south of the intersection of Mitchell Rd and Plainfield Brook Rd.**
1.2 Towns: **Barre Town, Plainfield**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1720**
2.1 Elevation Downstream: **960**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **14600** feet. **2.77** Miles.
2.3 Valley Slope: **5.21** %
2.4.Channel Length: **15526** feet. **2.94** Miles.
2.5 Channel Slope: **4.90** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **19** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**D**	**50.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**49.0** %
Water Table Shallow:	**1.0**	**49.0** %
Erodibility:	**Very Severe**	**90.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**530**	**419**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2479** **15 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	5
High	Low	Low	N.S.	N.S.	N.S.	Low	N.S.	Unk.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.05**
Topo Maps: **Barre East**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.11 miles northwest of Lower rd. at 0.12 miles southeast of the**
1.2 Towns: **Plainfield**
1.3 Downstream Latitude: **44.23**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1109**
2.1 Elevation Downstream: **1023**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5772** feet. **1.09** Miles.
2.3 Valley Slope: **1.49** %
2.4.Channel Length: **5772** feet. **1.09** Miles.
2.5 Channel Slope: **1.49** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: **219** feet.
2.10 Confinement Ratio: **13**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Not Evaluated**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**1716**	**87**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **78.0** Ratio: **4.8**
6.6 Wavelength: **12.0** Ratio: **0.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Not Evaluated**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	1 Low	2 High	0 N.S.	0 N.S.	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.06**
Topo Maps: **Barre East**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.02 miles northwest of Lower rd. at 0.67 miles northeast of the**
1.2 Towns: **Plainfield**
1.3 Downstream Latitude: **44.24**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **1314**
2.1 Elevation Downstream: **1109**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4753** feet. **0.90** Miles.
2.3 Valley Slope: **4.31** %
2.4.Channel Length: **4754** feet. **0.90** Miles.
2.5 Channel Slope: **4.31** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: **167** feet.
2.10 Confinement Ratio: **13**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**940**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **140.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **338.0** Ratio: **26.0**
6.6 Wavelength: **22.7** Ratio: **1.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	1 Low	0 N.S.	2 High	2 High	2 High	0 N.S.	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Gunners Brook** Reach **T2.07**
Topo Maps: **Barre East**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **0.01 miles south of Thompson rd. at 0.07 miles east of**
1.2 Towns: **Plainfield**
1.3 Downstream Latitude: **44.24**
1.3 Downstream Longitude: **-72.44**

Step 2. Stream Type

2.1 Elevation Upstream: **1611**
2.1 Elevation Downstream: **1314**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4125** feet. **0.78** Miles.
2.3 Valley Slope: **7.20** %
2.4.Channel Length: **4125** feet. **0.78** Miles.
2.5 Channel Slope: **7.20** %
2.6 Sinuosity: **1.00**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: **124** feet.
2.10 Confinement Ratio: **15**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **B**
Bedform: **Not Evaluated**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.:
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils
Hydrologic Group: %
Flooding: %
Water Table Deep: %
Water Table Shallow: %
Erodibility: **slight** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**100**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **35.0** **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **No Data**
6.5 Meander Width: **52.0** Ratio: **6.1**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Not Evaluated**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.D.	0 N.S.	0 N.S.	0

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.01**
Topo Maps: **BARRE EAST, BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.01 is 0.059 miles South from the intersection of Ayers St and S**
1.2 Towns: **Barre City**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.50**

Step 2. Stream Type

2.1 Elevation Upstream: **640**
2.1 Elevation Downstream: **610**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3222** feet. **0.61** Miles.
2.3 Valley Slope: **0.93** %
2.4.Channel Length: **3474** feet. **0.66** Miles.
2.5 Channel Slope: **0.86** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **48** Square Miles
2.8 Channel Width: **72** feet.
2.9 Valley Width: **981** feet.
2.10 Confinement Ratio: **14**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Other** **95.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**Not Rated**	**95.0**	%
Flooding:	**Occasional**	**95.0**	%
Water Table Deep:	**6.0**	**96.0**	%
Water Table Shallow:	**1.5**	**3.0**	%
Erodibility:	**slight**	**4.0**	%

7.4 Comments:

Reach is to strait to measure any meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **81.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**51-100**
Sub-dominant:	**26-50**	**26-50**
Length w/ less than 25 ft.:	**2242**	**2327**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **6** %
5.3 Bank Armoring: **1.0**
Left **2359** Right **1155**
5.4 Channel Straightening: **3128** **90 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2539** ft. **73 %**

	One Side	Both Sides	
Road:	**734** ft.	**1593**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**211.5** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**287** ft.	**3052**	ft.

6.3 Channel Bars: **Side**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **72.0** Ratio: **1.0**
6.6 Wavelength: **72.0** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **430.15 ft.**
7.2 Bank Height: **4.58 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	1 Low	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	19

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02 is 0.00959 miles South of the Intersection of West Patterson St**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **770**
2.1 Elevation Downstream: **640**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6792** feet. **1.29** Miles.
2.3 Valley Slope: **1.91** %
2.4.Channel Length: **7624** feet. **1.44** Miles.
2.5 Channel Slope: **1.71** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **48** Square Miles
2.8 Channel Width: **72** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Riffle-Pool**
Sub-class Slope: **c**
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Multiple**
3.3 Dominant Geologic Mat.: **Glacial Lake 48.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**49.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**48.0**	%
Water Table Shallow:	**6.0**	**48.0**	%
Erodibility:	**Severe**	**71.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **30.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**820**	**1891**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **34 %**
Left **239** Right **2395**
5.4 Channel Straightening: **3192** **41 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **5639** ft. **73 %**

	One Side	Both Sides	
Road:	**4589** ft.	**1050**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**2775** ft.	**1060**	ft.

6.3 Channel Bars: **Side**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **1,160.97 ft.**
7.2 Bank Height: **4.17 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 2 to Jail Branch** Reach **T3.02S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02S1.01 X=500879.481 Y=187620.304**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1050**
2.1 Elevation Downstream: **660**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4591** feet. **0.87** Miles.
2.3 Valley Slope: **8.49** %
2.4.Channel Length: **4936** feet. **0.93** Miles.
2.5 Channel Slope: **7.90** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **6** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **59.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**65.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**3.0**	**40.0** %
Water Table Shallow:	**1.5**	**40.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **82.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **88.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**26-50**	**>100**
Length w/ less than 25 ft.:	**951**	**2141**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **2 %**
Left **93** Right **25**
5.4 Channel Straightening: **2224** **45 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1134** ft. **22 %**

	One Side	Both Sides
Road:	**909** ft.	**225** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**862** ft.	**473** ft.

6.3 Channel Bars: **Side**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	2 High	2 High	1 Low	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	13

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 2 to Jail Branch** Reach **T3.02S2.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **488 ft south of Washington St and Phelps Place. 175 ft west along the**
1.2 Towns: **Barre City, Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.49**

Step 2. Stream Type

2.1 Elevation Upstream: **1020**
2.1 Elevation Downstream: **700**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3159** feet. **0.60** Miles.
2.3 Valley Slope: **10.13** %
2.4.Channel Length: **3491** feet. **0.66** Miles.
2.5 Channel Slope: **9.17** %
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **6** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **49.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**78.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**3.0**	**49.0** %
Water Table Shallow:	**1.5**	**49.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **35.0** %
Current Sub-Dominant Land Cover: **Forest**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **37.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**0-25**	**26-50**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **0** %
5.3 Bank Armoring: **2 %**
Left **44** Right **47**
5.4 Channel Straightening: **892** **25 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **920** ft. **26 %**

	One Side	Both Sides	
Road:	**701** ft.	**218** ft.	
Railroad:	**0.0** ft.	**0.0** ft.	
Berm:	**0.0** ft.	**0.0** ft.	
Improved Path:	**0.0** ft.	**0.0** ft.	
6.2 Development:	**155.3** ft.	**577** ft.	

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **339.31 ft.**
7.2 Bank Height: **5.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 3 to Reach 2 to Jail Branch** Reach **T3.02S3.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02S3.01 X= 502166.677 meters Y= 186399.355 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1210**
2.1 Elevation Downstream: **780**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4760** feet. **0.90** Miles.
2.3 Valley Slope: **9.03** %
2.4.Channel Length: **5172** feet. **0.98** Miles.
2.5 Channel Slope: **8.31** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **7** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **91.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**C**	**85.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.5**	**59.0** %
Water Table Shallow:	**1.5**	**59.0** %
Erodibility:	**Very Severe**	**91.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **55.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **36.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**696**	**1420**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **0** %
5.3 Bank Armoring: **1 %**
Left **34** Right **35**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1317.7**ft. **25 %**

	One Side	Both Sides
Road:	**1058** ft.	**128** ft.
Railroad:	**0.0** ft.	**130** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**1838** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **123.30 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Honey Brook** Reach **T3.02S4.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02S4.01 X= 502360.797 meters Y=186487.187 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1060**
2.1 Elevation Downstream: **780**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3091** feet. **0.59** Miles.
2.3 Valley Slope: **9.06** %
2.4.Channel Length: **3233** feet. **0.61** Miles.
2.5 Channel Slope: **8.66** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **23** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material:

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Till** **81.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**C**	**97.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.5**	**80.0** %
Water Table Shallow:	**1.5**	**80.0** %
Erodibility:	**Very Severe**	**82.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **42.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**232**	**451**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **4** %
5.3 Bank Armoring: **11 %**
Left **166.2** Right **197**
5.4 Channel Straightening: **1337** **41 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **209** ft. **6 %**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**209** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**327** ft.	**102** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **449.14 ft.**
7.2 Bank Height: **5.36 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	1 Low	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 1 to Honey Brook** Reach **T3.02S4.01S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02S4.01S1.01 X= 502643.023 meters Y= 186487.187 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1200**
2.1 Elevation Downstream: **880**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7442** feet. **1.41** Miles.
2.3 Valley Slope: **4.30** %
2.4.Channel Length: **7889** feet. **1.49** Miles.
2.5 Channel Slope: **4.06** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**84.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**48.0** %
Water Table Shallow:	**1.0**	**48.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **77.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**145**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **0** %
5.3 Bank Armoring: **7 %**
Left **418** Right **141**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1512** ft. **19 %**

	One Side	Both Sides
Road:	**1257** ft.	**255** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**245** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **409.66 ft.**
7.2 Bank Height: **5.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 1 to Honey Brook** Reach **T3.02S4.01S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.02S4.01S1.02 X= 504429.323 meters Y= 188149.827 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.44**

Step 2. Stream Type

2.1 Elevation Upstream: **1650**
2.1 Elevation Downstream: **1200**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7580** feet. **1.44** Miles.
2.3 Valley Slope: **5.94** %
2.4.Channel Length: **8021** feet. **1.52** Miles.
2.5 Channel Slope: **5.61** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**

3.5 Soils

Hydrologic Group:	**D**	**83.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**1.5**	**83.0**	%
Water Table Shallow:	**0.0**	**83.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **96.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **94** ft. **1 %**

	One Side	Both Sides	
Road:	**0.0** ft.	**94**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**0.0** ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
High	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Honey Brook** Reach **T3.02S4.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Go east 190 ft from the intersection of E. Cobble Hill Rd and W.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **1290**
2.1 Elevation Downstream: **1060**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6013** feet. **1.14** Miles.
2.3 Valley Slope: **3.83** %
2.4.Channel Length: **6940** feet. **1.31** Miles.
2.5 Channel Slope: **3.31** %
2.6 Sinuosity: **1.15**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**

3.5 Soils

Hydrologic Group:	**D**	**85.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**85.0** %
Water Table Shallow:	**0.0**	**85.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **48.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **36.0** %
Current Sub-Dominant Land Cover: **Wetland**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**1568**	**1231**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **5** **2** %
5.3 Bank Armoring: **0 %**
Left **0.0** Right **58**
5.4 Channel Straightening: **677** **9 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **261** ft. **3 %**

	One Side	Both Sides
Road:	**0.0** ft.	**261** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**226** ft.	**305** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **279.00 ft.**
7.2 Bank Height: **3.56 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	1 Low	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 2 to Honey Brook** Reach **T3.02S4.02S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **Go west 455 ft from the intersection of Sierra Lavin Rd and Pierce Rd.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **1410**
2.1 Elevation Downstream: **1130**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5247** feet. **0.99** Miles.
2.3 Valley Slope: **5.34** %
2.4.Channel Length: **5524** feet. **1.05** Miles.
2.5 Channel Slope: **5.07** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **10** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**59.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**59.0** %
Water Table Shallow:	**0.0**	**59.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **51.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Crop** **44.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**2999**	**3936**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **1** %
5.3 Bank Armoring: **1 %**
Left **30** Right **31**
5.4 Channel Straightening: **339** **6 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **749** ft. **13 %**

	One Side	Both Sides
Road:	**582.0** ft.	**167** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**201** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.03**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.03 is 1.30 miles South of Washington St and Waterman St. The**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.47**

Step 2. Stream Type

2.1 Elevation Upstream: **860**
2.1 Elevation Downstream: **770**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4483** feet. **0.85** Miles.
2.3 Valley Slope: **2.01** %
2.4.Channel Length: **5507** feet. **1.04** Miles.
2.5 Channel Slope: **1.63** %
2.6 Sinuosity: **1.23**
2.7 Watershed Area: **43** Square Miles
2.8 Channel Width: **69** feet.
2.9 Valley Width: **524** feet.
2.10 Confinement Ratio: **8**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact** **81.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**72.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**61.0** %
Water Table Shallow:	**0.0**	**61.0** %
Erodibility:	**Moderate**	**38.0** %

7.4 Comments:

Meanders appear to be influenced by Valley Shape - did not measure.

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **33.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**797**	**1571**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **24 %**
Left **498** Right **876**
5.4 Channel Straightening: **1773** **32 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **3637** ft. **66 %**

	One Side	Both Sides
Road:	**3266** ft.	**371** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**2685** ft.	**661.2** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **118.21 ft.**
7.2 Bank Height: **5.45 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	2 High	0 N.D.	0 N.D.	0 N.S.	0 N.S.	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 3 to Jail Branch** Reach **T3.03S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.03S2.01 X= 503095.368 meters Y= 185494.013 meters**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **1400**
2.1 Elevation Downstream: **870**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5562** feet. **1.05** Miles.
2.3 Valley Slope: **9.53** %
2.4.Channel Length: **5861** feet. **1.11** Miles.
2.5 Channel Slope: **9.04** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**94.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**82.0** %
Water Table Shallow:	**1.0**	**79.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **70.0** %
Current Sub-Dominant Land Cover: **Forest**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **51.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**26-50**
Length w/ less than 25 ft.:	**654**	**1310**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **1 %**
Left **82** Right **29**
5.4 Channel Straightening: **523** **8 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **646.5** ft. **11 %**

	One Side	Both Sides	
Road:	**224** ft.	**421**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**1086** ft.	**100**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **152.22 ft.**
7.2 Bank Height: **1.43 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	2 High	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.04**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.04 is 0.64 miles south of the intersection of TH-41 and E. Barre Rd.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **970**
2.1 Elevation Downstream: **860**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4663** feet. **0.88** Miles.
2.3 Valley Slope: **2.36** %
2.4.Channel Length: **5099** feet. **0.97** Miles.
2.5 Channel Slope: **2.16** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **42** Square Miles
2.8 Channel Width: **68** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **82.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**C**	**76.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.5**	**43.0** %
Water Table Shallow:	**1.5**	**43.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **35.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**1167**	**1033**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **2** %
5.3 Bank Armoring: **70 %**
Left **2207** Right **1387**
5.4 Channel Straightening: **2951** **57 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2646** ft. **51 %**

	One Side	Both Sides
Road:	**1361** ft.	**1284** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**1905** ft.	**90** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **244.80 ft.**
7.2 Bank Height: **3.41 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	15

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.05**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.05 is 0.04 miles West of Intersection of Washington Rd and East**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.45**

Step 2. Stream Type

2.1 Elevation Upstream: **1120**
2.1 Elevation Downstream: **970**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2672** feet. **0.51** Miles.
2.3 Valley Slope: **5.61** %
2.4.Channel Length: **2880** feet. **0.55** Miles.
2.5 Channel Slope: **5.21** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **40** Square Miles
2.8 Channel Width: **67** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope: **a**
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.: **Other** **51.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**

3.5 Soils

Hydrologic Group:	**Not Rated**	**51.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**51.0**	%
Water Table Shallow:	**0.0**	**21.0**	%
Erodibility:	**Moderate**	**48.0**	%

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Crop** **38.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**776**	**2004**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Large Store and Release**
Use: **Flood Control**
5.2 Bridges and Culverts: **1** **3** %
5.3 Bank Armoring: **1.0**
Left **2002** Right **1218**
5.4 Channel Straightening: **2597** **90 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1494** ft. **51 %**

	One Side		Both Sides	
Road:	**1375.2**	ft.	**119**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**1154**	ft.	**1556**	ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

7.4 Comments:

S. Pealer, 8/5/08: We are not confident in the reference stream type or confinement at this point due to the manipulation associated with the East Barre Dam. The valley width was not measured

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	2 High	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 5 to Jail Branch** Reach **T3.05S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **South east of the intersection of Old Rd 302, Bianchi St, Washington**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.45**

Step 2. Stream Type

2.1 Elevation Upstream: **1300**
2.1 Elevation Downstream: **980**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3811** feet. **0.72** Miles.
2.3 Valley Slope: **8.40** %
2.4.Channel Length: **4068** feet. **0.77** Miles.
2.5 Channel Slope: **7.87** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **94.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**91.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**56.0** %
Water Table Shallow:	**1.0**	**56.0** %
Erodibility:	**Very Severe**	**94.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **68.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **63.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**26-50**	**>100**
Length w/ less than 25 ft.:	**2242**	**1893**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **21 %**
Left **536** Right **319**
5.4 Channel Straightening: **1170** **28 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **752** ft. **18 %**

	One Side	Both Sides	
Road:	**477.4** ft.	**275**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**958** ft.	**1173**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	14

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 5 to Jail Branch** Reach **T3.05S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.05S1.02 X= 503514.826 meters Y= 183511.635 meters**
1.2 Towns: **Barre Town, Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **1510**
2.1 Elevation Downstream: **1300**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7748** feet. **1.47** Miles.
2.3 Valley Slope: **2.71** %
2.4.Channel Length: **8236** feet. **1.56** Miles.
2.5 Channel Slope: **2.55** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **71.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**85.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**59.0** %
Water Table Shallow:	**0.0**	**59.0** %
Erodibility:	**Severe**	**71.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **84.0** %
Current Sub-Dominant Land Cover: **Wetland**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**309**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **4 %**
Left **182** Right **183**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **197** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**197** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **35.0** Ratio: **2.4**
6.6 Wavelength: **123.0** Ratio: **8.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	0 N.S.	1 Low	7

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Orange Brook** Reach **T3.06S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.01 X= 505590.920 meters Y= 183340.070 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1135**
2.1 Elevation Downstream: **1130**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1778** feet. **0.34** Miles.
2.3 Valley Slope: **0.28** %
2.4.Channel Length: **2258** feet. **0.43** Miles.
2.5 Channel Slope: **0.22** %
2.6 Sinuosity: **1.27**
2.7 Watershed Area: **16** Square Miles
2.8 Channel Width: **44** feet.
2.9 Valley Width: **1,403** feet.
2.10 Confinement Ratio: **32**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **88.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**77.0** %
Flooding:	**Frequent**	**88.0** %
Water Table Deep:	**3.0**	**77.0** %
Water Table Shallow:	**1.5**	**77.0** %
Erodibility:	**slight**	**11.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **84.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Wetland** **63.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**0-25**	**0-25**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**1822**	**2104**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **154** **6 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **98** ft. **4 %**

	One Side	Both Sides
Road:	**0.0** ft.	**98** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **63.0** Ratio: **1.4**
6.6 Wavelength: **261.0** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	2 High	2 High	0 N.S.	0 N.S.	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Baker Brook** Reach **T3.06S1.01S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.01S1.01 X= 505817.025 meters Y= 183799.053 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1450**
2.1 Elevation Downstream: **1135**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8300** feet. **1.57** Miles.
2.3 Valley Slope: **3.80** %
2.4.Channel Length: **9679** feet. **1.83** Miles.
2.5 Channel Slope: **3.25** %
2.6 Sinuosity: **1.17**
2.7 Watershed Area: **4** Square Miles
2.8 Channel Width: **23** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **79.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**48.0** %
Flooding:	**None/Rare**	**98.0** %
Water Table Deep:	**1.5**	**48.0** %
Water Table Shallow:	**0.0**	**55.0** %
Erodibility:	**Very Severe**	**86.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **89.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**185**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **184** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**184** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Baker Brook** Reach **T3.06S1.01S1.03**
Topo Maps: **BARRE EAST, KNOX MOUNTAIN**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.01S1.03 X= 507832.489 meters Y= 184854.208 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.39**

Step 2. Stream Type

2.1 Elevation Upstream: **1750**
2.1 Elevation Downstream: **1500**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6843** feet. **1.30** Miles.
2.3 Valley Slope: **3.65** %
2.4.Channel Length: **7242** feet. **1.37** Miles.
2.5 Channel Slope: **3.45** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **98.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**96.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**96.0** %
Water Table Shallow:	**0.0**	**96.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **95.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **82.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **198** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**198** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	1

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Orange Brook** Reach **T3.06S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.02 X= 505811.631 meters Y=183808.755 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1180**
2.1 Elevation Downstream: **1135**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3046** feet. **0.58** Miles.
2.3 Valley Slope: **1.48** %
2.4.Channel Length: **4135** feet. **0.78** Miles.
2.5 Channel Slope: **1.09** %
2.6 Sinuosity: **1.36**
2.7 Watershed Area: **12** Square Miles
2.8 Channel Width: **39** feet.
2.9 Valley Width: **844** feet.
2.10 Confinement Ratio: **22**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **58.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**B**	**60.0**	%
Flooding:	**Frequent**	**58.0**	%
Water Table Deep:	**3.0**	**58.0**	%
Water Table Shallow:	**1.5**	**58.0**	%
Erodibility:	**Moderate**	**28.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **84.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **51.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Large Withdrawal**
Use: **Drinking**
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **896** **21 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **196.0** Ratio: **5.1**
6.6 Wavelength: **304.0** Ratio: **7.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	2 High	0 N.S.	2 High	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Orange Brook** Reach **T3.06S1.04**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.04 X= 506212.960 meters Y= 185208.497 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **1270**
2.1 Elevation Downstream: **1190**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5824** feet. **1.10** Miles.
2.3 Valley Slope: **1.37** %
2.4.Channel Length: **6739** feet. **1.28** Miles.
2.5 Channel Slope: **1.19** %
2.6 Sinuosity: **1.16**
2.7 Watershed Area: **11** Square Miles
2.8 Channel Width: **37** feet.
2.9 Valley Width: **948** feet.
2.10 Confinement Ratio: **25**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **38.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**45.0** %
Flooding:	**None/Rare**	**61.0** %
Water Table Deep:	**1.5**	**34.0** %
Water Table Shallow:	**0.0**	**53.0** %
Erodibility:	**Moderate**	**39.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **84.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **65.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **Large Store and Release**
Use: **Drinking**
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **613** **9 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1069** ft. **15 %**

	One Side	Both Sides
Road:	**871** ft.	**197** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **120.0** Ratio: **3.2**
6.6 Wavelength: **238.0** Ratio: **6.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	1 Low	0 N.S.	2 High	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Nelson Brook** Reach **T3.06S1.05S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Wed, October 15, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.05S1.02 X= 506577.856 meters Y= 187249.033 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **1420**
2.1 Elevation Downstream: **1275**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5327** feet. **1.01** Miles.
2.3 Valley Slope: **2.72** %
2.4.Channel Length: **5818** feet. **1.10** Miles.
2.5 Channel Slope: **2.49** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **6** Square Miles
2.8 Channel Width: **29** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **B**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**57.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**57.0** %
Water Table Shallow:	**0.0**	**57.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **94.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **27.5** **0 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**0.0** ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	0

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Nate Smith Brook** Reach **T3.06S1.05S1.02S1.**
Topo Maps: **BARRE EAST, KNOX MOUNTAIN**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.05S1.02S1.02 X= 508593.681 meters Y= 187682.197 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.39**

Step 2. Stream Type

2.1 Elevation Upstream: **2490**
2.1 Elevation Downstream: **1480**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **12407** feet. **2.35** Miles.
2.3 Valley Slope: **8.14** %
2.4.Channel Length: **13439** feet. **2.55** Miles.
2.5 Channel Slope: **7.52** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**73.0** %
Flooding:	**None/Rare**	**99.0** %
Water Table Deep:	**1.5**	**73.0** %
Water Table Shallow:	**0.0**	**73.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **96.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	0

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Nelson Brook** Reach **T3.06S1.05S1.03**
Topo Maps: **BARRE EAST**
Date Last Edited: **Fri, October 24, 2008**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.05S1.03** **X= 507827.064 meters Y= 186720.990 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.40**

Step 2. Stream Type

2.1 Elevation Upstream: **1480**
2.1 Elevation Downstream: **1420**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2247** feet. **0.43** Miles.
2.3 Valley Slope: **2.67** %
2.4.Channel Length: **2545** feet. **0.48** Miles.
2.5 Channel Slope: **2.36** %
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **21** feet.
2.9 Valley Width: **478** feet.
2.10 Confinement Ratio: **23**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**D**	**60.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**59.0** %
Water Table Shallow:	**0.0**	**59.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Stream is not visible to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **95.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **66.0** %
Current Sub-Dominant Land Cover:

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**---**	**---**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Not Evaluated**
Type:
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**

	Left	Right
5.4 Channel Straightening:		**0.0**

5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	ft.	ft.
Railroad:	ft.	ft.
Berm:	ft.	ft.
Improved Path:	ft.	ft.
6.2 Development:	ft.	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion:
7.2 Bank Height:
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.D.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 Unk.	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	1 Low	1

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Nelson Brook** Reach **T3.06S1.05S1.04**
Topo Maps: **BARRE EAST, KNOX MOUNTAIN**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.05S1.04** **X= 508303.453 meters Y= 186308.284 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.18**
1.3 Downstream Longitude: **-72.40**

Step 2. Stream Type

2.1 Elevation Upstream: **2645**
2.1 Elevation Downstream: **1480**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **19717** feet. **3.73** Miles.
2.3 Valley Slope: **5.91** %
2.4.Channel Length: **22823** feet. **4.32** Miles.
2.5 Channel Slope: **5.10** %
2.6 Sinuosity: **1.16**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **20** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **90.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**57.0**	%
Flooding:	**None/Rare**	**99.0**	%
Water Table Deep:	**2.0**	**53.0**	%
Water Table Shallow:	**1.0**	**53.0**	%
Erodibility:	**Very Severe**	**93.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **95.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **66.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **108** ft. **0 %**

	One Side	Both Sides	
Road:	**0.0**	ft. **108**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	0

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Orange Brook** Reach **T3.06S1.06**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.06S1.06 X= 506607.144 meters Y= 188033.541 Meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.19**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **1530**
2.1 Elevation Downstream: **1275**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9952** feet. **1.88** Miles.
2.3 Valley Slope: **2.56** %
2.4.Channel Length: **10461** feet. **1.98** Miles.
2.5 Channel Slope: **2.44** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **17** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **70.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**D**	**76.0** %
Flooding:	**None/Rare**	**91.0** %
Water Table Deep:	**1.5**	**50.0** %
Water Table Shallow:	**0.0**	**50.0** %
Erodibility:	**Severe**	**56.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **69.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **64.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**356**	**288**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **158** **1 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **125** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**125** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
High	Low	Low	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.07**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.07 is 0.11 miles South of Reservoir Rd and Route 302. The reach is**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1135**
2.1 Elevation Downstream: **1130**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2657** feet. **0.50** Miles.
2.3 Valley Slope: **0.19** %
2.4.Channel Length: **4742** feet. **0.90** Miles.
2.5 Channel Slope: **0.11** %
2.6 Sinuosity: **1.78**
2.7 Watershed Area: **21** Square Miles
2.8 Channel Width: **50** feet.
2.9 Valley Width: **1,831** feet.
2.10 Confinement Ratio: **37**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **94.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**94.0**	%
Flooding:	**Occasional**	**67.0**	%
Water Table Deep:	**6.0**	**68.0**	%
Water Table Shallow:	**4.0**	**67.0**	%
Erodibility:	**slight**	**5.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Wetland** **68.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**51-100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**1097**	**1060**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **420** **8 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **152.0** Ratio: **3.0**
6.6 Wavelength: **184.0** Ratio: **3.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **68.16 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	0 N.S.	1 Low	1 Low	1 Low	2 High	0 N.S.	1 Low	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 7 to Jail Branch** Reach **T3.07S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.07S1.01 X= 505896.231 meters Y= 182652.748 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1155**
2.1 Elevation Downstream: **1140**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1202** feet. **0.23** Miles.
2.3 Valley Slope: **1.25** %
2.4.Channel Length: **1400** feet. **0.27** Miles.
2.5 Channel Slope: **1.07** %
2.6 Sinuosity: **1.16**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: **663** feet.
2.10 Confinement Ratio: **36**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**B**	**95.0** %
Flooding:	**Frequent**	**85.0** %
Water Table Deep:	**3.0**	**80.0** %
Water Table Shallow:	**1.5**	**80.0** %
Erodibility:	**slight**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Field** **43.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**26-50**	**>100**
Sub-dominant:	**0-25**	**>100**
Length w/ less than 25 ft.:	**1127**	**691**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **58.0** Ratio: **3.2**
6.6 Wavelength: **87.0** Ratio: **4.8**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	1 Low	2 High	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 7 to Jail Branch** Reach **T3.07S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.07S1.02 X= 506228.418 meters Y= 182525.260 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **1650**
2.1 Elevation Downstream: **1155**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **12578** feet. **2.38** Miles.
2.3 Valley Slope: **3.94** %
2.4.Channel Length: **14140** feet. **2.68** Miles.
2.5 Channel Slope: **3.50** %
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **71.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**59.0** %
Flooding:	**None/Rare**	**82.0** %
Water Table Deep:	**1.5**	**59.0** %
Water Table Shallow:	**0.0**	**59.0** %
Erodibility:	**Severe**	**66.0** %

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **78.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **65.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**1852**	**2065**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **8** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1051** **7 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1725** ft. **12 %**

	One Side	Both Sides
Road:	**1156** ft.	**568** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**131** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

7.4 Comments:

S.Pealer, 8/5/08: Apparently, windshield surveys indicated that there may be some short portions of the reach better classified as Broad or very Broad and maybe dune ripple/sand. However, the

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.08**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.08- X= 505880.023 meters Y= 182638.107 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1150**
2.1 Elevation Downstream: **1135**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3919** feet. **0.74** Miles.
2.3 Valley Slope: **0.38** %
2.4.Channel Length: **6529** feet. **1.24** Miles.
2.5 Channel Slope: **0.23** %
2.6 Sinuosity: **1.67**
2.7 Watershed Area: **18** Square Miles
2.8 Channel Width: **47** feet.
2.9 Valley Width: **1,728** feet.
2.10 Confinement Ratio: **37**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **86.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**88.0**	%
Flooding:	**Occasional**	**82.0**	%
Water Table Deep:	**6.0**	**82.0**	%
Water Table Shallow:	**4.0**	**82.0**	%
Erodibility:	**slight**	**11.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **28.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**2316**	**3495**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1150** **17 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **182.0** Ratio: **3.9**
6.6 Wavelength: **327.0** Ratio: **6.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	0 N.S.	2 High	1 Low	1 Low	1 Low	0 N.S.	1 Low	13

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 8 to Jail Branch** Reach **T3.08S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.08S1.01 X= 505954.758 meters Y= 181500.057 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1170**
2.1 Elevation Downstream: **1150**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1015** feet. **0.19** Miles.
2.3 Valley Slope: **1.97** %
2.4.Channel Length: **1420** feet. **0.27** Miles.
2.5 Channel Slope: **1.41** %
2.6 Sinuosity: **1.40**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **21** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **82.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Flat**
3.5 Soils

Hydrologic Group:	**B**	**82.0**	%
Flooding:	**Occasional**	**65.0**	%
Water Table Deep:	**6.0**	**74.0**	%
Water Table Shallow:	**4.0**	**65.0**	%
Erodibility:	**slight**	**17.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **82.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **30.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**26-50**	**26-50**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**560**	**567**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **284.4** **20 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **118** ft. **8 %**

	One Side	Both Sides
Road:	**0.0** ft.	**118** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Point**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **63.0** Ratio: **2.9**
6.6 Wavelength: **126.0** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	1 Low	1 Low	2 High	2 High	0 N.S.	1 Low	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 8 to Jail Branch** Reach **T3.08S1.02**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **north 160 ft from the intersection of Spencer Rd and Tucker Rd. North**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **1430**
2.1 Elevation Downstream: **1170**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6030** feet. **1.14** Miles.
2.3 Valley Slope: **4.31** %
2.4.Channel Length: **6350** feet. **1.20** Miles.
2.5 Channel Slope: **4.09** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **21** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**72.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**72.0** %
Water Table Shallow:	**0.0**	**72.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **83.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **85.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **241** ft. **3 %**

	One Side	Both Sides
Road:	**0.0** ft.	**241** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Sub Trib 1 to Reach 8 to Jail** Reach **T3.08S1.02S1.01**
Topo Maps: **BARRE EAST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.08S1.02S1.01 X= 505954.758 meters Y= 181500.057 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.40**

Step 2. Stream Type

2.1 Elevation Upstream: **1770**
2.1 Elevation Downstream: **1430**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6856** feet. **1.30** Miles.
2.3 Valley Slope: **4.96** %
2.4.Channel Length: **7209** feet. **1.37** Miles.
2.5 Channel Slope: **4.72** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **92.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**52.0** %
Flooding:	**None/Rare**	**93.0** %
Water Table Deep:	**2.0**	**45.0** %
Water Table Shallow:	**0.0**	**52.0** %
Erodibility:	**Very Severe**	**93.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **89.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **93.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **487** **6 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **205.4** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**205.4** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**134.5** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	3

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 8 to Jail Branch** Reach **T3.08S1.03**
Topo Maps: **BARRE EAST, WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.08S1.03 X= 507873.257 meters Y= 181495.818 meters**
1.2 Towns: **Orange**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.40**

Step 2. Stream Type

2.1 Elevation Upstream: **2020**
2.1 Elevation Downstream: **1430**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7353** feet. **1.39** Miles.
2.3 Valley Slope: **8.02** %
2.4.Channel Length: **7858** feet. **1.49** Miles.
2.5 Channel Slope: **7.51** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**C**	**50.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**49.0** %
Water Table Shallow:	**0.0**	**49.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **90.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **77.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2199** ft. **27 %**

	One Side	Both Sides
Road:	**1997** ft.	**201** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	5

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.09**
Topo Maps: **BARRE EAST, WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.09- X= 505953.286 Y=181487.029**
1.2 Towns: **Orange, Washington**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1170**
2.1 Elevation Downstream: **1150**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4669** feet. **0.88** Miles.
2.3 Valley Slope: **0.43** %
2.4.Channel Length: **6414** feet. **1.21** Miles.
2.5 Channel Slope: **0.31** %
2.6 Sinuosity: **1.37**
2.7 Watershed Area: **15** Square Miles
2.8 Channel Width: **43** feet.
2.9 Valley Width: **1,142** feet.
2.10 Confinement Ratio: **27**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-class Slope:
Bed Material: **Sand**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **87.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**B**	**89.0** %
Flooding:	**Frequent**	**69.0** %
Water Table Deep:	**3.0**	**67.0** %
Water Table Shallow:	**1.5**	**71.0** %
Erodibility:	**slight**	**8.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **33.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**2106**	**3548**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0 %**
Left **0.0** Right **42**
5.4 Channel Straightening: **1147** **17 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **100** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**100** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Multiple**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **152.0** Ratio: **3.5**
6.6 Wavelength: **333.0** Ratio: **7.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	2 High	1 Low	1 Low	0 N.S.	0 N.S.	13

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.10**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10- X= 505877.884 meters Y= 180103.863 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1240**
2.1 Elevation Downstream: **1170**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5230** feet. **0.99** Miles.
2.3 Valley Slope: **1.34** %
2.4.Channel Length: **6210** feet. **1.18** Miles.
2.5 Channel Slope: **1.13** %
2.6 Sinuosity: **1.19**
2.7 Watershed Area: **13** Square Miles
2.8 Channel Width: **41** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Multiple**
3.3 Dominant Geologic Mat.: **Alluvial** **52.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**B**	**68.0**	%
Flooding:	**None/Rare**	**47.0**	%
Water Table Deep:	**3.0**	**37.0**	%
Water Table Shallow:	**1.5**	**37.0**	%
Erodibility:	**Moderate**	**40.0**	%

7.4 Comments:

Reach is to strait measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **73.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **52.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**437**	**1598**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **2 %**
Left **65** Right **64**
5.4 Channel Straightening: **592** **9 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **89** ft. **1 %**

	One Side		Both Sides	
Road:	**0.0**	ft.	**89**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**156**	ft.	**0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.D.	0 N.D.	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 10 to Jail Branch** Reach **T3.10S1.01**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S1.01 X=508349.666 meters Y= 178956.286 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1320**
2.1 Elevation Downstream: **1240**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4867** feet. **0.92** Miles.
2.3 Valley Slope: **1.64** %
2.4.Channel Length: **5923** feet. **1.12** Miles.
2.5 Channel Slope: **1.35** %
2.6 Sinuosity: **1.22**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: **347** feet.
2.10 Confinement Ratio: **23**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **75.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**66.0** %
Flooding:	**None/Rare**	**96.0** %
Water Table Deep:	**0.5**	**39.0** %
Water Table Shallow:	**0.0**	**42.0** %
Erodibility:	**Moderate**	**41.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **59.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **244** ft. **4 %**

	One Side	Both Sides
Road:	**0.0** ft.	**244** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **48.0** Ratio: **3.2**
6.6 Wavelength: **84.0** Ratio: **5.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	1 Low	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 10 to Jail Branch** Reach **T3.10S1.02**
Topo Maps: **BARRE EAST, WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S1.02 X= 504376.952 meters Y= 179967.338 meters**
1.2 Towns: **Washington, Williamstown**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.45**

Step 2. Stream Type

2.1 Elevation Upstream: **1900**
2.1 Elevation Downstream: **1320**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7052** feet. **1.34** Miles.
2.3 Valley Slope: **8.22** %
2.4.Channel Length: **7592** feet. **1.44** Miles.
2.5 Channel Slope: **7.64** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **11** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**70.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**70.0** %
Water Table Shallow:	**0.0**	**70.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **68.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **88.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **135** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**135** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
High	Low	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 10 to Jail Branch** Reach **T3.10S2.01**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S2.01 X= 505398.527 meters Y= 178917.949 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1280**
2.1 Elevation Downstream: **1240**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2754** feet. **0.52** Miles.
2.3 Valley Slope: **1.45** %
2.4.Channel Length: **3258** feet. **0.62** Miles.
2.5 Channel Slope: **1.23** %
2.6 Sinuosity: **1.18**
2.7 Watershed Area: **5** Square Miles
2.8 Channel Width: **26** feet.
2.9 Valley Width: **488** feet.
2.10 Confinement Ratio: **19**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Alluvial** **34.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**B**	**34.0**	%
Flooding:	**None/Rare**	**65.0**	%
Water Table Deep:	**3.0**	**34.0**	%
Water Table Shallow:	**1.5**	**34.0**	%
Erodibility:	**Moderate**	**50.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **51.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**51-100**
Sub-dominant:	**26-50**	**0-25**
Length w/ less than 25 ft.:	**181**	**2286**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1794** **55 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **189** ft. **5 %**

	One Side	Both Sides
Road:	**0.0** ft.	**189** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **26.0** Ratio: **1.0**
6.6 Wavelength: **26.0** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	2 High	0 N.S.	1 Low	14

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 10 to Jail Branch** Reach **T3.10S2.02**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S2.01 X= 505090.326 meters Y= 178232.388 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.44**

Step 2. Stream Type

2.1 Elevation Upstream: **1440**
2.1 Elevation Downstream: **1280**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6944** feet. **1.32** Miles.
2.3 Valley Slope: **2.30** %
2.4.Channel Length: **8411** feet. **1.59** Miles.
2.5 Channel Slope: **1.90** %
2.6 Sinuosity: **1.21**
2.7 Watershed Area: **5** Square Miles
2.8 Channel Width: **25** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope: **c**
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **93.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**81.0** %
Flooding:	**None/Rare**	**94.0** %
Water Table Deep:	**1.5**	**81.0** %
Water Table Shallow:	**0.0**	**81.0** %
Erodibility:	**Very Severe**	**93.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **111** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**111** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4
High	Low	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	Low	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub to Sub Trib 2 to Reach 10 to Jail** Reach **T3.10S2.02S1.01**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S2.02S1.01 X= 504410.779 meters Y= 178106.100 meters**
1.2 Towns: **Washington, Williamstown**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.44**

Step 2. Stream Type

2.1 Elevation Upstream: **1650**
2.1 Elevation Downstream: **1360**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7933** feet. **1.50** Miles.
2.3 Valley Slope: **3.66** %
2.4.Channel Length: **8535** feet. **1.62** Miles.
2.5 Channel Slope: **3.40** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**90.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**90.0** %
Water Table Shallow:	**0.0**	**90.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **70.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **80.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1420** ft. **16 %**

	One Side	Both Sides
Road:	**943** ft.	**476** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 2 to Reach 10 to Jail Branch** Reach **T3.10S2.03**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.10S2.03 X= 503110.318 meters Y= 177815.188 meters**
1.2 Towns: **Washington, Williamstown**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.46**

Step 2. Stream Type

2.1 Elevation Upstream: **1700**
2.1 Elevation Downstream: **1440**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5809** feet. **1.10** Miles.
2.3 Valley Slope: **4.48** %
2.4.Channel Length: **6852** feet. **1.30** Miles.
2.5 Channel Slope: **3.79** %
2.6 Sinuosity: **1.18**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**C**	**61.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**2.0**	**61.0**	%
Water Table Shallow:	**1.0**	**61.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **79.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **69.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **540** ft. **7 %**

	One Side		Both Sides	
Road:	**236**	ft.	**304**	ft.
Railroad:	**0.0**	ft.	**0.0**	ft.
Berm:	**0.0**	ft.	**0.0**	ft.
Improved Path:	**0.0**	ft.	**0.0**	ft.
6.2 Development:	**0.0**	ft.	**0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	5
High	Low	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	Low	N.S.	N.S.	N.S.	N/A	N/A	N.S.	Low	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.11**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.11- X = 505405.153 meters Y = 178914.282 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1280**
2.1 Elevation Downstream: **1240**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2108** feet. **0.40** Miles.
2.3 Valley Slope: **1.90** %
2.4.Channel Length: **2830** feet. **0.54** Miles.
2.5 Channel Slope: **1.41** %
2.6 Sinuosity: **1.34**
2.7 Watershed Area: **7** Square Miles
2.8 Channel Width: **30** feet.
2.9 Valley Width: **850** feet.
2.10 Confinement Ratio: **28**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.: **Alluvial** **42.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Flat**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**B**	**61.0**	%
Flooding:	**None/Rare**	**57.0**	%
Water Table Deep:	**3.0**	**42.0**	%
Water Table Shallow:	**1.5**	**61.0**	%
Erodibility:	**Moderate**	**28.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **77.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **55.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**26-50**	**0-25**
Sub-dominant:	**26-50**	**0-25**
Length w/ less than 25 ft.:	**2024**	**2029**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **3** %
5.3 Bank Armoring: **12 %**
Left **253** Right **112**
5.4 Channel Straightening: **1675** **59 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **502** ft. **17 %**

	One Side	Both Sides
Road:	**278.0** ft.	**224** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **30.5** Ratio: **1.0**
6.6 Wavelength: **30.5** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	1 Low	2 High	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	2 High	2 High	0 N.S.	1 Low	16

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.12**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.12- is 0.1418 miles West of intersection of Route 110 and West**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1310**
2.1 Elevation Downstream: **1280**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1815** feet. **0.34** Miles.
2.3 Valley Slope: **1.65** %
2.4.Channel Length: **2020** feet. **0.38** Miles.
2.5 Channel Slope: **1.49** %
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **7** Square Miles
2.8 Channel Width: **30** feet.
2.9 Valley Width: **346** feet.
2.10 Confinement Ratio: **11**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Glacial Lake 36.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Hilly**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**58.0**	%
Flooding:	**None/Rare**	**66.0**	%
Water Table Deep:	**1.5**	**39.0**	%
Water Table Shallow:	**0.0**	**37.0**	%
Erodibility:	**Moderate**	**29.0**	%

7.4 Comments:

Stream is to strait to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **77.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **55.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**>100**	**51-100**
Length w/ less than 25 ft.:	**467**	**608**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **2** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **416** **20 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **166.5** ft. **8 %**

	One Side	Both Sides	
Road:	**50** ft.	**116**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**0.0** ft.	**0.0**	ft.

6.3 Channel Bars: **Island**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	1 Low	2 High	0 N.D.	0 N.D.	0 N.S.	0 N.S.	12

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 12 to Jail Branch** Reach **T3.12S1.01**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **119 ft north west of the intersection of W. Corinth Rd and Vermette**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1450**
2.1 Elevation Downstream: **1300**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3833** feet. **0.73** Miles.
2.3 Valley Slope: **3.91** %
2.4.Channel Length: **4247** feet. **0.80** Miles.
2.5 Channel Slope: **3.53** %
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **18** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**78.0** %
Flooding:	**None/Rare**	**99.0** %
Water Table Deep:	**1.5**	**78.0** %
Water Table Shallow:	**0.0**	**78.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **80.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **38.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**51-100**
Sub-dominant:	**0-25**	**0-25**
Length w/ less than 25 ft.:	**1048**	**106**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **266** **6 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1311** ft. **30 %**

	One Side	Both Sides
Road:	**1079** ft.	**232** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 12 to Jail Branch** Reach **T3.12S1.02**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.12S1.02 X= 506787.419 meters Y= 178777.115 meters**
1.2 Towns: **Orange, Washington**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.42**

Step 2. Stream Type

2.1 Elevation Upstream: **2180**
2.1 Elevation Downstream: **1450**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9848** feet. **1.87** Miles.
2.3 Valley Slope: **7.41** %
2.4.Channel Length: **10309** feet. **1.95** Miles.
2.5 Channel Slope: **7.08** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **14** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**70.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**70.0** %
Water Table Shallow:	**0.0**	**70.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **91.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **74.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**187**	**208**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **362** **3 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**0.0** ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	1

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.13**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.13- X = 505915.317 meters Y = 177949.034 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1440**
2.1 Elevation Downstream: **1310**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3256** feet. **0.62** Miles.
2.3 Valley Slope: **3.99** %
2.4.Channel Length: **3579** feet. **0.68** Miles.
2.5 Channel Slope: **3.63** %
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **4** Square Miles
2.8 Channel Width: **24** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **92.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**D**	**59.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**0.5**	**32.0** %
Water Table Shallow:	**-1.0**	**34.0** %
Erodibility:	**Severe**	**62.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **78.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **47.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **179** ft. **5 %**

	One Side	Both Sides
Road:	**0.0** ft.	**179** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **Island**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 14 to Jail Branch** Reach **T3.14S1.01**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.14S1.01 X= 505756.289 meters Y= 176657.788 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.09**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1480**
2.1 Elevation Downstream: **1470**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2123** feet. **0.40** Miles.
2.3 Valley Slope: **0.47** %
2.4.Channel Length: **2272** feet. **0.43** Miles.
2.5 Channel Slope: **0.44** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **11** feet.
2.9 Valley Width: **406** feet.
2.10 Confinement Ratio: **38**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact 30.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**C**	**60.0** %
Flooding:	**None/Rare**	**78.0** %
Water Table Deep:	**1.5**	**33.0** %
Water Table Shallow:	**0.0**	**64.0** %
Erodibility:	**Moderate**	**43.0** %

7.4 Comments:

Stream is not visible to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 68.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 63.0** %
Current Sub-Dominant Land Cover: **Wetland**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **133** ft. **5 %**

	One Side	Both Sides
Road:	**0.0** ft.	**133** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.D.	0 N.D.	0 N.S.	0 N.S.	5

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 14 to Jail Branch** Reach **T3.14S1.02**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.14S1.02 X= 505479.831 meters Y= 177190.863 meters**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.10**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **1780**
2.1 Elevation Downstream: **1480**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **6698** feet. **1.27** Miles.
2.3 Valley Slope: **4.48** %
2.4.Channel Length: **6990** feet. **1.32** Miles.
2.5 Channel Slope: **4.29** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Not Evaluated**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**57.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**52.0** %
Water Table Shallow:	**0.0**	**52.0** %
Erodibility:	**Very Severe**	**93.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **69.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**4280**	**2252**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **95** ft. **1 %**

	One Side	Both Sides
Road:	**0.0** ft.	**95** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	6

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Jail Branch** Reach **T3.15**
Topo Maps: **WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T3.15 X= 505862.359 meters Y= 176058.172**
1.2 Towns: **Washington**
1.3 Downstream Latitude: **44.08**
1.3 Downstream Longitude: **-72.43**

Step 2. Stream Type

2.1 Elevation Upstream: **2120**
2.1 Elevation Downstream: **1490**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **9165** feet. **1.74** Miles.
2.3 Valley Slope: **6.87** %
2.4.Channel Length: **9536** feet. **1.81** Miles.
2.5 Channel Slope: **6.61** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Glacial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**48.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**48.0** %
Water Table Shallow:	**0.0**	**48.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **83.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **69.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **311** ft. **3 %**

	One Side	Both Sides
Road:	**0.0** ft.	**311** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
High	Low	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 4 to Stevens Branch** Reach **T4.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T4.01 0.75 miles from the intersection of Holden Rd and S. Barre Rd.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **840**
2.1 Elevation Downstream: **730**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2237** feet. **0.42** Miles.
2.3 Valley Slope: **4.92** %
2.4.Channel Length: **2553** feet. **0.48** Miles.
2.5 Channel Slope: **4.31** %
2.6 Sinuosity: **1.14**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **16** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Glacial Lake** **96.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**B**	**67.0** %
Flooding:	**None/Rare**	**96.0** %
Water Table Deep:	**6.0**	**67.0** %
Water Table Shallow:	**6.0**	**67.0** %
Erodibility:	**Very Severe**	**96.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **66.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **41.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**596**	**599**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **496** **19 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Braiding**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 4 to Stevens Branch** Reach **T4.03**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T4.03 is 0.574 miles North from the intersection of Snowbrdige Rd**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.16**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1030**
2.1 Elevation Downstream: **850**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **2615** feet. **0.50** Miles.
2.3 Valley Slope: **6.88** %
2.4.Channel Length: **2650** feet. **0.50** Miles.
2.5 Channel Slope: **6.79** %
2.6 Sinuosity: **1.01**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **14** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**95.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**100.** %
Water Table Shallow:	**6.0**	**100.** %
Erodibility:	**Very Severe**	**100.** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **68.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **43.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 4 to Stevens Branch** Reach **T4.05**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T4.05 is 0.101 miles East of the intersection of Route 63 and Miller Rd.**
1.2 Towns: **Barre Town**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1080**
2.1 Elevation Downstream: **1030**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **982** feet. **0.19** Miles.
2.3 Valley Slope: **5.09** %
2.4.Channel Length: **1012** feet. **0.19** Miles.
2.5 Channel Slope: **4.94** %
2.6 Sinuosity: **1.03**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **12** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**D**	**55.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**44.0**	%
Water Table Shallow:	**6.0**	**44.0**	%
Erodibility:	**Severe**	**73.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **73.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **47.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**51-100**
Length w/ less than 25 ft.:	**536**	**226**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **112** **11 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**399**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	0 Unk.	2 High	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 4 to Stevens Branch** Reach **T4.07**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T4.07 is 0.14 miles North of the intersection of Miller Rd and**
1.2 Towns: **Barre Town, Berlin**
1.3 Downstream Latitude: **44.17**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1480**
2.1 Elevation Downstream: **1090**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **7109** feet. **1.35** Miles.
2.3 Valley Slope: **5.49** %
2.4.Channel Length: **7406** feet. **1.40** Miles.
2.5 Channel Slope: **5.27** %
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Boulder**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**D**	**99.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**89.0**	%
Water Table Shallow:	**6.0**	**89.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **94.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **89.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**386**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **226.0** **3 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	1 Low	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	4

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Martin Brook** Reach **T5.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.01 X= 497629.493 meters Y= 182517.399 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **810**
2.1 Elevation Downstream: **750**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1441** feet. **0.27** Miles.
2.3 Valley Slope: **4.16** %
2.4.Channel Length: **1632** feet. **0.31** Miles.
2.5 Channel Slope: **3.68** %
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **6** Square Miles
2.8 Channel Width: **28** feet.
2.9 Valley Width: **372** feet.
2.10 Confinement Ratio: **13**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **Yes**
3.2 Grade Control: **Ledge**
3.3 Dominant Geologic Mat.: **Alluvial** **83.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**
3.5 Soils

Hydrologic Group:	**B**	**90.0** %
Flooding:	**Frequent**	**74.0** %
Water Table Deep:	**3.0**	**74.0** %
Water Table Shallow:	**1.5**	**80.0** %
Erodibility:	**slight**	**16.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **74.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **25.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**26-50**
Length w/ less than 25 ft.:	**0**	**588**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **413** **25 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **74.0** Ratio: **2.7**
6.6 Wavelength: **178.0** Ratio: **6.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	0 N.S.	2 High	1 Low	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 1 to Martin Brook** Reach **T5.01S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.01S1.01 X= 497241.829 meters Y= 182499.472 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **1210**
2.1 Elevation Downstream: **810**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8225** feet. **1.56** Miles.
2.3 Valley Slope: **4.86** %
2.4.Channel Length: **9115** feet. **1.73** Miles.
2.5 Channel Slope: **4.39** %
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **13** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**61.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**54.0** %
Water Table Shallow:	**6.0**	**54.0** %
Erodibility:	**Severe**	**63.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **83.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**865**	**877**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides	
Road:	**0.0**	ft. **0.0**	ft.
Railroad:	**0.0**	ft. **0.0**	ft.
Berm:	**0.0**	ft. **0.0**	ft.
Improved Path:	**0.0**	ft. **0.0**	ft.
6.2 Development:	**0.0**	ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	6
High	Low	Low	N.S.	N.S.	N.S.	N.S.	N.S.	Unk.	N.S.	N.S.	Low	N/A	N/A	N.S.	Low	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Reach 1 to Martin Brook** Reach **T5.01S1.01S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.01S1.01S1. X= 496628.007 meters Y= 182037.432 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1230**
2.1 Elevation Downstream: **820**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4129** feet. **0.78** Miles.
2.3 Valley Slope: **9.93** %
2.4.Channel Length: **4437** feet. **0.84** Miles.
2.5 Channel Slope: **9.24** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **8** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**76.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**74.0** %
Water Table Shallow:	**0.0**	**74.0** %
Erodibility:	**Very Severe**	**97.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **65.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **48.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**26-50**	**>100**
Length w/ less than 25 ft.:	**1279**	**246**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1652** **37 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**182** ft.	**250.9** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Martin Brook** Reach **T5.02**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.02 is 0.300 miles North West of the intersection of Falls Bridge Rd**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.14**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **920**
2.1 Elevation Downstream: **810**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3485** feet. **0.66** Miles.
2.3 Valley Slope: **3.16** %
2.4.Channel Length: **3802** feet. **0.72** Miles.
2.5 Channel Slope: **2.89** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **4** Square Miles
2.8 Channel Width: **25** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **95.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**
3.5 Soils

Hydrologic Group:	**C**	**49.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**46.0** %
Water Table Shallow:	**0.0**	**46.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **63.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **812.8** **21 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft. **0.0**	ft.
Railroad:	**0.0** ft. **0.0**	ft.
Berm:	**0.0** ft. **0.0**	ft.
Improved Path:	**0.0** ft. **0.0**	ft.
6.2 Development:	**0.0** ft. **0.0**	ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	5
High	N.S.	N.S.	N.S.	N.S.	N.S.	High	N.S.	Unk.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	Low	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 2 to Martin Brook** Reach **T5.02S1.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.02S1.01 X= 496706.130 meters Y= 183372.216 meters**
1.2 Towns: **Barre Town, Berlin, Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1380**
2.1 Elevation Downstream: **920**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **11343** feet. **2.15** Miles.
2.3 Valley Slope: **4.06** %
2.4.Channel Length: **11996** feet. **2.27** Miles.
2.5 Channel Slope: **3.83** %
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **86.0** %
3.3 Sub-dominant Geological Mat.: **Other**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**94.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**47.0** %
Water Table Shallow:	**0.0**	**47.0** %
Erodibility:	**Very Severe**	**76.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **71.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **65.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**206**	**2511**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **1664** **13 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1405** ft. **11 %**

	One Side	Both Sides
Road:	**1009** ft.	**396** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Martin Brook** Reach **T5.03**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T5.03 X= 496694.861 meters Y=183341.142 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.15**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **1380**
2.1 Elevation Downstream: **920**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8537** feet. **1.62** Miles.
2.3 Valley Slope: **5.39** %
2.4.Channel Length: **9268** feet. **1.76** Miles.
2.5 Channel Slope: **4.96** %
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **20** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**C**	**64.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**2.0**	**53.0**	%
Water Table Shallow:	**1.0**	**53.0**	%
Erodibility:	**Very Severe**	**99.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **78.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **61.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **0.0** **0.0**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **121** ft. **1 %**

	One Side	Both Sides	
Road:	**0.0** ft.	**121**	ft.
Railroad:	**0.0** ft.	**0.0**	ft.
Berm:	**0.0** ft.	**0.0**	ft.
Improved Path:	**0.0** ft.	**0.0**	ft.
6.2 Development:	**0.0** ft.	**0.0**	ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
High	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N/A	N/A	N.S.	N.S.	

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 6 to Stevens Branch** Reach **T6.01**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T6.01 is 0.086 miles South of the intersection of Sunnyside Lane and Williamstown**
1.2 Towns:
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **800**
2.1 Elevation Downstream: **770**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **1588** feet. **0.30** Miles.
2.3 Valley Slope: **1.89** %
2.4.Channel Length: **1667** feet. **0.32** Miles.
2.5 Channel Slope: **1.80** %
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **22** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-class Slope:
Bed Material: **Gravel**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact 100.** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Hilly**
3.5 Soils

Hydrologic Group:	**A**	**85.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**6.0**	**100.** %
Water Table Shallow:	**6.0**	**100.** %
Erodibility:	**Moderate**	**42.0** %

7.4 Comments:

Stream is not visible to measure the meanders

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 53.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest 30.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**>100**
Length w/ less than 25 ft.:	**200**	**73**

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **463** **27 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **0.0** ft. **0.0**

	One Side	Both Sides
Road:	**0.0** ft.	**0.0** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: Ratio: **0.0**
6.6 Wavelength: Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	0 Unk.	0 N.S.	0 N.S.	1 Low	0 N.D.	0 N.D.	0 N.S.	0 N.S.	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 6 to Stevens Branch** Reach **T6.02**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T6.02 is due North 0.061 miles from the intersection of Vesper Rd and Williamstown**
1.2 Towns:
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.53**

Step 2. Stream Type

2.1 Elevation Upstream: **990**
2.1 Elevation Downstream: **800**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3795** feet. **0.72** Miles.
2.3 Valley Slope: **5.01** %
2.4.Channel Length: **4302** feet. **0.81** Miles.
2.5 Channel Slope: **4.42** %
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **3** Square Miles
2.8 Channel Width: **22** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Ice-Contact** **58.0** %
3.3 Sub-dominant Geological Mat.: **Till**
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**A**	**58.0**	%
Flooding:	**None/Rare**	**100.**	%
Water Table Deep:	**6.0**	**58.0**	%
Water Table Shallow:	**6.0**	**58.0**	%
Erodibility:	**Very Severe**	**95.0**	%

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **40.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **858** **19 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1267** ft. **29 %**

	One Side	Both Sides
Road:	**918** ft.	**349** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**638** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	1 Low	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	9

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 1 to Trib 6 to Stevens Branch** Reach **T6.02S1.01**
Topo Maps: **BARRE WEST, BROOKFIELD, WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T6.02S1.01 X= 498535.294 Y= 180691.251 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **1930**
2.1 Elevation Downstream: **990**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **12488** feet. **2.37** Miles.
2.3 Valley Slope: **7.53** %
2.4.Channel Length: **13515** feet. **2.56** Miles.
2.5 Channel Slope: **6.96** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Extremely Steep**
3.4 Right Valley Side **Extremely Steep**

3.5 Soils

Hydrologic Group:	**C**	**89.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**56.0** %
Water Table Shallow:	**1.0**	**56.0** %
Erodibility:	**Very Severe**	**95.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **58.0** %
Current Sub-Dominant Land Cover: **Urban**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **78.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**0-25**	**>100**
Length w/ less than 25 ft.:	**577**	**475**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **679** **5 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1216** ft. **9 %**

	One Side	Both Sides
Road:	**856** ft.	**359** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**210.8** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	1 Low	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	1 Low	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 6 to Stevens Branch** Reach **T6.03**
Topo Maps: **BARRE WEST, BROOKFIELD, WASHINGTON**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T6.03 is 0.24 miles from the intersection of Graniteville Rd and Jay**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.52**

Step 2. Stream Type

2.1 Elevation Upstream: **1560**
2.1 Elevation Downstream: **990**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **8300** feet. **1.57** Miles.
2.3 Valley Slope: **6.87** %
2.4.Channel Length: **9118** feet. **1.73** Miles.
2.5 Channel Slope: **6.25** %
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **14** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**85.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**83.0** %
Water Table Shallow:	**1.0**	**83.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **34.0** %
Current Sub-Dominant Land Cover: **Field**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**2416**	**2395**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **162** **1 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **210** ft. **2 %**

	One Side	Both Sides
Road:	**0.0** ft.	**210** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	8

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 7 to Stevens Branch** Reach **T7.01**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.01 is at the intersection of Railroad St and Brockway Hill Rd. At**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.54**

Step 2. Stream Type

2.1 Elevation Upstream: **960**
2.1 Elevation Downstream: **850**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **3712** feet. **0.70** Miles.
2.3 Valley Slope: **2.96** %
2.4.Channel Length: **4187** feet. **0.79** Miles.
2.5 Channel Slope: **2.63** %
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **4** Square Miles
2.8 Channel Width: **24** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **55.0** %
3.3 Sub-dominant Geological Mat.: **Ice-Contact**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**A**	**29.0** %
Flooding:	**None/Rare**	**85.0** %
Water Table Deep:	**6.0**	**67.0** %
Water Table Shallow:	**6.0**	**67.0** %
Erodibility:	**Very Severe**	**84.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Urban**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **47.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**26-50**
Sub-dominant:	**51-100**	**26-50**
Length w/ less than 25 ft.:	**426**	**1944**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **1** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2624** **62 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1861** ft. **44 %**

	One Side	Both Sides
Road:	**1175** ft.	**686** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**379** ft.	**1220** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	2 High	2 High	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	14

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 1 to Trib 7 to Stevens Branch** Reach **T7.01S1.01**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.01S1.01 X= 496030.062 meters Y= 180208.669 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **1170**
2.1 Elevation Downstream: **960**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5625** feet. **1.07** Miles.
2.3 Valley Slope: **3.73** %
2.4.Channel Length: **6762** feet. **1.28** Miles.
2.5 Channel Slope: **3.11** %
2.6 Sinuosity: **1.20**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Dam**
3.3 Dominant Geologic Mat.: **Till** **87.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**61.0** %
Flooding:	**None/Rare**	**87.0** %
Water Table Deep:	**6.0**	**37.0** %
Water Table Shallow:	**0.0**	**48.0** %
Erodibility:	**Severe**	**74.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **45.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **28.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**>100**	**>100**
Length w/ less than 25 ft.:	**1853**	**743**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **6** **1** %
5.3 Bank Armoring: **2 %**
Left **0.0** Right **183**
5.4 Channel Straightening: **1806** **26 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1660** ft. **24 %**

	One Side	Both Sides
Road:	**1368** ft.	**291** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**420** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	2 High	1 Low	0 N.S.	2 High	0 N/A	0 N/A	0 N.S.	1 Low	14

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Sub Trib 1 to Trib 7 to Stevens Branch** Reach **T7.01S1.01S1.01**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.01S1.01S1.01 X= 494925.316 meters Y= 179320.806 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **1640**
2.1 Elevation Downstream: **1170**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5285** feet. **1.00** Miles.
2.3 Valley Slope: **8.89** %
2.4.Channel Length: **5979** feet. **1.13** Miles.
2.5 Channel Slope: **7.86** %
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **10** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **97.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Steep**
3.5 Soils

Hydrologic Group:	**D**	**71.0** %
Flooding:	**None/Rare**	**98.0** %
Water Table Deep:	**1.5**	**56.0** %
Water Table Shallow:	**0.0**	**57.0** %
Erodibility:	**Very Severe**	**83.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **37.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **39.0** %
Current Sub-Dominant Land Cover: **Crop**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**2292**	**1793**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **2251** **37 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1021** ft. **17 %**

	One Side	Both Sides
Road:	**905.9** ft.	**116** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	2 High	0 N.S.	1 Low	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	1 Low	11

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 1 to Trib 7 to Stevens Branch** Reach **T7.01S1.02**
Topo Maps: **BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.01S1.02 X= 494928.705 meters Y= 179351.305 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.11**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **1560**
2.1 Elevation Downstream: **1170**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4752** feet. **0.90** Miles.
2.3 Valley Slope: **8.21** %
2.4.Channel Length: **5089** feet. **0.96** Miles.
2.5 Channel Slope: **7.66** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **0** Square Miles
2.8 Channel Width: **9** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.: **Alluvial**
3.4 Left Valley Side **Very Steep**
3.4 Right Valley Side **Very Steep**

3.5 Soils

Hydrologic Group:	**C**	**64.0** %
Flooding:	**None/Rare**	**99.0** %
Water Table Deep:	**6.0**	**57.0** %
Water Table Shallow:	**6.0**	**57.0** %
Erodibility:	**Very Severe**	**98.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **40.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**51-100**	**>100**
Sub-dominant:	**26-50**	**51-100**
Length w/ less than 25 ft.:	**1325**	**795**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **1** %
5.3 Bank Armoring: **4 %**
Left **109** Right **96**
5.4 Channel Straightening: **707** **13 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1939** ft. **38 %**

	One Side	Both Sides
Road:	**1746** ft.	**193** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration:
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **Bend**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	0 N.S.	0 N.S.	0 N.S.	0 N/A	0 N/A	0 N.S.	1 Low	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 7 to Stevens Branch** Reach **T7.02**
Topo Maps: **BARRE WEST, BROOKFIELD**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.02 is from the intersection of Brush Hill rd and Route 64, due west**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.12**
1.3 Downstream Longitude: **-72.55**

Step 2. Stream Type

2.1 Elevation Upstream: **1140**
2.1 Elevation Downstream: **960**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **4603** feet. **0.87** Miles.
2.3 Valley Slope: **3.91** %
2.4.Channel Length: **4937** feet. **0.94** Miles.
2.5 Channel Slope: **3.65** %
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **2** Square Miles
2.8 Channel Width: **19** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**D**	**64.0** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**1.5**	**36.0** %
Water Table Shallow:	**0.0**	**36.0** %
Erodibility:	**Severe**	**71.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **69.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Urban** **31.0** %
Current Sub-Dominant Land Cover: **Forest**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**234**

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **0** %
5.3 Bank Armoring: **7 %**
Left **197** Right **186**
5.4 Channel Straightening: **936** **18 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **1385** ft. **28 %**

	One Side	Both Sides
Road:	**1020** ft.	**365** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**286** ft.	**0.0** ft.

6.3 Channel Bars: **None**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
2 High	2 High	0 N.S.	0 N.S.	0 N.S.	1 Low	1 Low	0 N.S.	2 High	1 Low	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	10

Stevens Branch

Phase 1 - Reach Summary Report

Basin: **Winooski**
Stream Name: **Trib 7 to Stevens Branch** Reach **T7.03**
Topo Maps: **BARRE WEST**
Date Last Edited: **Tue, March 31, 2009**
Watershed: **Winooski River**
Sub-watershed: **Winooski River -- headwaters to North Branch**
Is Reach an Impoundment? **No** Quality Control Status: **Unknown**

Step 1. Reach Location

1.1 Reach Description: **T7.03- X= 495081.987meters Y=180932.300 meters**
1.2 Towns: **Williamstown**
1.3 Downstream Latitude: **44.13**
1.3 Downstream Longitude: **-72.56**

Step 2. Stream Type

2.1 Elevation Upstream: **1450**
2.1 Elevation Downstream: **1140**
2.1 Is Gradient Gentle? **No**
2.2 Valley Length: **5202** feet. **0.99** Miles.
2.3 Valley Slope: **5.96** %
2.4.Channel Length: **5633** feet. **1.07** Miles.
2.5 Channel Slope: **5.50** %
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **1** Square Miles
2.8 Channel Width: **15** feet.
2.9 Valley Width: feet.
2.10 Confinement Ratio: **0**
2.10 Confinement Type: **Narrowly Confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-class Slope:
Bed Material: **Cobble**

Step 3. Basin Characteristics:

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geologic Mat.: **Till** **99.0** %
3.3 Sub-dominant Geological Mat.:
3.4 Left Valley Side **Steep**
3.4 Right Valley Side **Steep**

3.5 Soils

Hydrologic Group:	**C**	**100.** %
Flooding:	**None/Rare**	**100.** %
Water Table Deep:	**2.0**	**70.0** %
Water Table Shallow:	**1.0**	**70.0** %
Erodibility:	**Very Severe**	**99.0** %

7.4 Comments:

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **82.0** %
Current Sub-Dominant Land Cover: **Field**

4.2 Corridor

Historic Land Cover: **Not Evaluated**
Current Dominant land Cover: **Forest** **57.0** %
Current Sub-Dominant Land Cover: **Urban**

4.3 Riparian Buffer	Left Bank	Right Bank
Dominant:	**>100**	**>100**
Sub-dominant:	**51-100**	**51-100**
Length w/ less than 25 ft.:	**0**	**0**

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old):
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0** %
5.3 Bank Armoring: **0.0**
Left **0.0** Right **0.0**
5.4 Channel Straightening: **667** **11 %**
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms and Roads old **2122** ft. **37 %**

	One Side	Both Sides
Road:	**2006** ft.	**115** ft.
Railroad:	**0.0** ft.	**0.0** ft.
Berm:	**0.0** ft.	**0.0** ft.
Improved Path:	**0.0** ft.	**0.0** ft.
6.2 Development:	**0.0** ft.	**0.0** ft.

6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Migration**
6.5 Meander Width: **N/A** Ratio: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0.00 ft.**
7.2 Bank Height: **0.00 ft.**
7.3 Ice/Debris Jam Potential: **None**

4.1	4.2	4.3	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	Total
1 Low	2 High	0 N.S.	0 N.S.	0 N.S.	0 N.S.	1 Low	0 N.S.	2 High	0 N.S.	0 N.S.	1 Low	0 N/A	0 N/A	0 N.S.	0 N.S.	7

Stream: **Stevens Branch** Reach # **M1.01** Segment: **A** Completion Date: **July 27, 2006**

Organization: **Winooski Conservation District** Observers: **Kelsey Rydland, Noelia Báez-** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,750** Segment Location: **M 1.01A is located between at the confluences with the Winooski and ~200ft upstream from**

QC Status - Staff: Passed **Cons** **Passed**

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	411	230
height	0	0
Railroads	811	0
height	0	0
Improved Paths	0	0
height	0	0
Development	1,188	342

1.4 Adjacent Side	Left	Right
Hillside Slope	Very Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Not Evalua

1.5 Valley Features

Valley Width (ft) **1,050**

Width Determination **Estimated**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **yes**

Step 2. Stream Channel

2.1 Bankfull Width **86**

2.2 Max Depth (ft) **5.80**

2.3 Mean Depth (ft) **4.80**

2.4 Floodprone Width (ft) **789**

Notes:

-Historic Straightening
-The tributary has access to the floodplain.
-Increase in the size of the depositional features near the confluences with the Winooski River.
-Sediment traps along the left bank on the

Step 2. (Contued)

2.5 Aband. Floodpln **7.80** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **17.87**

2.7 Entrenchment Ratio **9.20**

2.8 Incision Ratio **1.34**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Complete**

2.11 Riffle/Step Spacing (ft) **440**

2.12 Substrate Composition

Bedrock	0%
Boulder	1%
Cobble	11%
Coarse Gravel	43%
Fine Gravel	18%
Sand	27%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **15** %

Large Woody **36**

2.13 Average Largest Particle on

Bed **160.0** **mm**

Bar **40.0** **mm**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Gravel	Gravel
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	502	709
Erosion Height (ft)	9.18	10.25
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	402	141
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	Deciduous
Bank Canopy	Left	Right
Canopy %	1-25	26-50
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	26-50	>100
Sub-dominant	51-100	51-100
W less than 25	0	0
Buffer Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Commercial	Forest
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	1	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	2	2
Diagonal	Delta	Island
0	2	2

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	1	1

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **355**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.01** Segment: **B** Completion Date: **July 3, 2006**

Organization: **Winooski Conservation District** Observers: **Kelsey Rydland, Noelia Báez-** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,416** Segment Location: **M 1.01B is located ~200ft upstream from the mid-reach island (parallel to the end of Cedar**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	254	0
height	0	0
Roads	0	1,125
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	1,145

1.4 Adjacent Side	Left	Right
Hillside Slope	Very Steep	Very Steep
Continuous w/	Always	Sometimes
W/in 1 Bankfill	Always	Sometimes
Texture	Sand	Sand

1.5 Valley Features

Valley Width (ft) **1,050**

Width Determination **Estimated**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **yes**

Step 2. Stream Channel

2.1 Bankfull Width **69**

2.2 Max Depth (ft) **4.70**

2.3 Mean Depth (ft) **3.90**

2.4 Floodprone Width (ft) **107**

Notes:

The physical characteristic of the cross section indicated an F Stream Type. The entrenchments values calculated in the field have been modified using the adjusting factor of +/- 0.2. This is Semi-confined section characterize by high revetment bank on both

Step 2. (Contued)

2.5 Aband. Floodpln **9.40** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **17.69**

2.7 Entrenchment Ratio **1.55**

2.8 Incision Ratio **2.00**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Eroded**

2.11 Riffle/Step Spacing (ft) **0**

2.12 Substrate Composition

Bedrock	0%
Boulder	1%
Cobble	20%
Coarse Gravel	41%
Fine Gravel	7%
Sand	31%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **7** %

Large Woody **12**

2.13 Average Largest Particle on

Bed **158.0** mm

Bar **8.0** mm

2.14 Stream Type

Stream Type: **F**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Plane Bed**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Mix
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	1,073	898
Near Bank Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	76-100	76-100
Mid-Channel Canopy	Closed	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	0-25	26-50
W less than 25	0	0
Buffer Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Commercial	Residential
Sub-dominant	Residential	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	2	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	1	0

Diagonal	Delta	Island
0	0	1

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **421**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Stevens Branch** Reach # **M1.10** Segment: **A** Completion Date: **September 23, 2008**

Organization: **Redstart Consulting** Observers: **TM, RM** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,837** Segment Location: **From just upstream of Bridge St bridge to just downstream of Rte 63 bridge.**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Depositional Features**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	888	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	782	13

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Not Evalua

1.5 Valley Features

Valley Width (ft) **531**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **44**

2.2 Max Depth (ft) **4.80**

2.3 Mean Depth (ft) **3.11**

2.4 Floodprone Width (ft) **531**

Notes:

Started new habitat protocol, memory for geomorph feels fuzzy. Bankfull was difficult to determine. A different choice might have made this an E stream. Note that LWD reflects the new habitat protocol. Updated the phase 1 stream width to 39.5 (width of

Step 2. (Contued)

2.5 Aband. Floodpln **7.10** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **14.18**

2.7 Entrenchment Ratio **12.04**

2.8 Incision Ratio **1.48**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **111**

2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	4%
Fine Gravel	24%
Sand	72%
Silt and smaller	0%

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **143**

2.13 Average Largest Particle on

Bed **1.1** **inches**

Bar **1.1** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Sand**

Subclass Slope: **None**

Bed Form: **Dune-Ripple**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Gravel	Gravel
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	112	193
Erosion Height (ft)	0.57	4.78
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	286	57
Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Herbaceous	None
Bank Canopy	Left	Right
Canopy %	1-25	1-25

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	0-25	51-100
W less than 25	206	0
Buffer Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	5	8
Diagonal	Delta	Island
0	1	1

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
2	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **540**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.10
Observers: TM, AS
Segment Location: just downstream of Route 63 bridge to upstream of VAST bridge where stream comes close

April 7, 2009 SGAT Version: 4.56
Segment: B
Why Not assessed:
Completion Date: September 11, 2008
Rain: Yes

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Depositional Features**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	545	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	1,392	237

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Never	Never
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Not Evalua	Not Evalua

1.5 Valley Features
Valley Width (ft): 552
Width Determination: Measured
Confinement Type: Very Broad
Rock Gorge?: No
Human-caused Change?: No

Step 2. Stream Channel

2.1 Bankfull Width: 40
2.2 Max Depth (ft): 4.95
2.3 Mean Depth (ft): 3.09
2.4 Floodprone Width (ft): 552

Notes:

Some straightening in bridge areas (400'). Stream is true to ph 1 classification. Poor bank buffers. Lots of erosion. Updated phase 1 stream width to width of this segment. Is the longest segment without extensive riprapping and has an intermediate width. Some

Step 2. (Contued)

2.5 Aband. Floodpln: 6.20 ft.
Human Elev Floodpln: 0.00 ft.
2.6 Width/Depth Ratio: 12.78
2.7 Entrenchment Ratio: 13.97
2.8 Incision Ratio: 1.25
Human Elevated Inc Rat: 0.00
2.9 Sinuosity: High
2.10 Riffles Type: Complete
2.11 Riffle/Step Spacing (ft): 201
2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	5%
Fine Gravel	17%
Sand	78%
Silt and smaller	0%

Silt/Clay Present?: Yes
Detritus: 1 %
Large Woody: 183
2.13 Average Largest Particle on
Bed: N/A
Bar: N/A

Not Evaluated

2.14 Stream Type
Stream Type: E
Bed Material: Sand
Subclass Slope: None
Bed Form: Dune-Ripple
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	Multiple	10.75
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: Steep

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	1,183	656
Erosion Height (ft)	4.77	4.15
Revetmt. Type	Multiple	Multiple
Revetmt. Length (ft)	378	472
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Shrubs/Saplin
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	0	0
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	0-25	0-25
W less than 25	1,623	2,168
Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Industrial	None
Mass Failures	78	217
Height	0	11
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: Minimal
4.2 Adjacent Wetlands: None
4.3 Flow Status: Moderate
4.4 # of Debris Jams: 3
4.5 Flow Regulation Type: Small
Flow Regulation Use: Other
Impoundments: None
Impoundmt. Location:
4.6 Up/Down strm flow reg: None
(old) Upstrm Flow Reg: None
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	3

4.9 # of Beaver Dams: 0
Affected Length (ft): 0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
7	11	5

Diagonal	Delta	Island
1	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
3	0	1	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
2	1	No

5.4 Stream Ford or Animal: No
5.5 Straightening: Straightening
Straightening Length: 583
5.5 Dredging: None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.10** Segment: **C** Completion Date: **September 11, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Smith** Why Not assessed: Rain: **Yes**

Segment Length (ft): **963** Segment Location: **From upstream of VAST bridge and beginning of straightened section to end of**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Corridor Encroachment**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**963**	**0**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**963**	**0**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Sometimes**	**Sometimes**
Texture	**Mixed**	**Other**

1.5 Valley Features

Valley Width (ft) **140**

Width Determination **Measured**

Confinement Type **Semi-confined**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **36**

2.2 Max Depth (ft) **4.40**

2.3 Mean Depth (ft) **3.38**

2.4 Floodprone Width (ft) **140**

Notes:

Entire length is straightened. Called it planebed. Valley has been narrowed and the stream channel fits the Ph 1 E stream type. Updated Ph 1 width to 39.5 (seg B width), but this segment still comes out as semi-confined and it is likely to stay that way due to human

Step 2. (Contued)

2.5 Aband. Floodpln **8.10** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **10.50**

2.7 Entrenchment Ratio **3.95**

2.8 Incision Ratio **1.84**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Not Applicable**

2.11 Riffle/Step Spacing (ft) **0**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**0** %
Cobble	**0** %
Coarse Gravel	**9** %
Fine Gravel	**30** %
Sand	**58** %
Silt and smaller	**3** %

Silt/Clay Present? **Yes**

Detritus **2** %

Large Woody **26**

2.13 Average Largest Particle on

Bed **5.0** **inches**

Bar **1.0** **inches**

2.14 Stream Type

Stream Type: **E**

Bed Material: **Sand**

Subclass Slope: **None**

Bed Form: **Plane Bed**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**None**	**0.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	**Sand**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Silt**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**50**	**162**
Erosion Height (ft)	**6.00**	**4.26**
Revetmt. Type	**None**	**Rip-Rap**
Revetmt. Length (ft)	**0**	**368**

Near Bank Veg. Type	Left	Right
Dominant	**Herbaceous**	**Herbaceous**
Sub-dominant	**Shrubs/Saplin**	**Shrubs/Saplin**

Bank Canopy	Left	Right
Canopy %	**0**	**0**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**>100**	**0-25**
Sub-dominant	**0-25**	**None**
W less than 25	**464**	**949**

Buffer Veg. Type	Left	Right
Dominant	**Herbaceous**	**Herbaceous**
Sub-dominant	**None**	**None**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Shrubs/Saplin**	**Industrial**
Sub-dominant	**None**	**Bare**
Mass Failures	**0**	**0**
Height	**0**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **None**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**0**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**2**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	**2**	**3**

Diagonal	Delta	Island
0	**0**	**0**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
1	**0**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **963**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.10 | Observers: McLane, Smith | Segment Location: Top of straighted and developed section to just above tributary at base of M1-11 where

April 7, 2009 SGAT Version: 4.56
Segment: D | Why Not assessed: | Completion Date: September 30, 2008
Rain: Yes

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Planform and Scope**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	575	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	575	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Never
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Mixed	Not Evalua

1.5 Valley Features
Valley Width (ft): **288**
Width Determination: **Measured**
Confinement Type: **Broad**
Rock Gorge?: **No**
Human-caused Change?: **Yes**

Step 2. Stream Channel

2.1 Bankfull Width: **41**
2.2 Max Depth (ft): **5.05**
2.3 Mean Depth (ft): **3.08**
2.4 Floodprone Width (ft): **288**

Notes:

Naturally meandering section of stream. Trib input at the top end is extensive, seasonally. Includes road runoff from Rte14 and has created a deep eroded channel. This short segment shows considerable signs of widening and aggredation, possible due to

Step 2. (Contued)

2.5 Aband. Floodpln: **6.00** ft.
Human Elev Floodpln: **0.00** ft.
2.6 Width/Depth Ratio: **13.31**
2.7 Entrenchment Ratio: **7.02**
2.8 Incision Ratio: **1.19**
Human Elevated Inc Rat: **0.00**
2.9 Sinuosity: **High**
2.10 Riffles Type: **Sedimented**
2.11 Riffle/Step Spacing (ft): **190**
2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	5%
Coarse Gravel	23%
Fine Gravel	22%
Sand	50%
Silt and smaller	0%

Silt/Clay Present?: **No**
Detritus: **1** %
Large Woody: **25**
2.13 Average Largest Particle on
Bed: **3.8** inches
Bar: **0.8** inches

2.14 Stream Type
Stream Type: **C**
Bed Material: **Sand**
Subclass Slope: **None**
Bed Form: **Riffle-Pool**
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Sand
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	200	35
Erosion Height (ft)	5.00	5.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	Deciduous

Bank Canopy	Left	Right
Canopy %	26-50	26-50

Mid-Channel Canopy: **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	None	51-100
W less than 25	0	0

Buffer Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Herbaceous	Herbaceous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	None	Residential
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: **Minimal**
4.2 Adjacent Wetlands: **Minimal**
4.3 Flow Status: **Moderate**
4.4 # of Debris Jams: **1**
4.5 Flow Regulation Type: **None**
Flow Regulation Use
Impoundments: **None**
Impoundmt. Location
4.6 Up/Down strm flow reg: **None**
(old) Upstrm Flow Reg: **None**
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams: **0**
Affected Length (ft): **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
1	2	4

Diagonal	Delta	Island
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
2	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
3	0	No

5.4 Stream Ford or Animal: **No**
5.5 Straightening: **Straightening**
Straightening Length: **270**
5.5 Dredging: **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.11** Segment: **A** Completion Date: **September 30, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane, Smith** Why Not assessed: Rain: **Yes**

Segment Length (ft): **3,048** Segment Location: **Starts just upstream of trib input from across Rte 14 about 900 feet north of Morris Drive**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	1,021	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	941	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Never
W/in 1 Bankfill	Sometimes	Never
Texture	Mixed	Mixed

1.5 Valley Features

Valley Width (ft) **521**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **43**

2.2 Max Depth (ft) **4.90**

2.3 Mean Depth (ft) **3.34**

2.4 Floodprone Width (ft) **454**

Notes:

Some straightening in mid-section of this reach. This was probably for agricultural reasons. Updated Ph 1 width to 41.0 (seg C width) since that segment has a high FAIR rating and was the least riprapped. This width, however, caused that segment to be

Step 2. (Contued)

2.5 Aband. Floodpln **7.60** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **12.99**

2.7 Entrenchment Ratio **10.46**

2.8 Incision Ratio **1.55**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **High**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **126**

2.12 Substrate Composition

Bedrock	0%
Boulder	4%
Cobble	5%
Coarse Gravel	14%
Fine Gravel	23%
Sand	54%
Silt and smaller	0%

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **26**

2.13 Average Largest Particle on

Bed **3.1** **inches**

Bar **0.1** **inches**

2.14 Stream Type

Stream Type: **E**

Bed Material: **Sand**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Gravel
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	926	684
Erosion Height (ft)	6.21	4.92
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	170	328
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	Deciduous
Bank Canopy	Left	Right
Canopy %	1-25	1-25
Mid-Channel Canopy		Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	0-25	0-25
W less than 25	934	1,172
Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Deciduous
Sub-dominant	Shrubs/Saplin	Herbaceous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Forest
Sub-dominant	Hay	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **6**

4.5 Flow Regulation Type **Small**

Flow Regulation Use **Other**

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	1	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
10	11	8

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
5	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
2	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **1,426**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.11
Observers: DR, TM
Segment Location: Begins approximately 3030 upstream of beginning of reach (where trib comes in on RB) and

April 7, 2009 SGAT Version: 4.56
Segment: B
Completion Date: September 20, 2008
Why Not assessed:
Rain: Yes

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Planform and Scope**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	409	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Flat	Flat
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Sand	Sand

1.5 Valley Features
Valley Width (ft): 887
Width Determination: Measured
Confinement Type: Very Broad
Rock Gorge?: No
Human-caused Change?: Yes

Step 2. Stream Channel

2.1 Bankfull Width: 27
2.2 Max Depth (ft): 5.80
2.3 Mean Depth (ft): 4.60
2.4 Floodprone Width (ft): 887

Notes:
All of this segment has been straightened. Riprap is extensive. The PH 1 width has been updated to 41.0 (seg C width).

Step 2. (Contued)

2.5 Aband. Floodpln: 7.40 ft.
Human Elev Floodpln: 0.00 ft.
2.6 Width/Depth Ratio: 5.96
2.7 Entrenchment Ratio: 32.37
2.8 Incision Ratio: 1.28
Human Elevated Inc Rat: 0.00
2.9 Sinuosity: Low
2.10 Riffles Type: Not Applicable
2.11 Riffle/Step Spacing (ft): 0
2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	3%
Fine Gravel	41%
Sand	56%
Silt and smaller	0%

Silt/Clay Present?: No
Detritus: 1 %
Large Woody: 16
2.13 Average Largest Particle on
Bed: 2.1 inches
Bar: 0.0 inches

2.14 Stream Type
Stream Type: E
Bed Material: Sand
Subclass Slope: None
Bed Form: Plane Bed
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: Undercut

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	86	105
Erosion Height (ft)	4.00	4.39
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	1,088	1,431
Near Bank Veg. Type	Left	Right
Dominant	Pasture	Pasture
Sub-dominant	Shrubs/Saplin	Deciduous
Bank Canopy	Left	Right
Canopy %	1-25	1-25
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	26-50	26-50
W less than 25	1,077	1,453
Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	Deciduous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Crop	Hay
Sub-dominant	None	Residential
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: Minimal
4.2 Adjacent Wetlands: Minimal
4.3 Flow Status: Moderate
4.4 # of Debris Jams: 1
4.5 Flow Regulation Type: None
Flow Regulation Use
Impoundments: None
Impoundmt. Location
4.6 Up/Down strm flow reg: None
(old) Upstrm Flow Reg: None
4.7 StormwaterInputs

Field Ditch	4	Road Ditch	0
Other	0	Tile Drain	1
Overland Flow	1	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams: 0
Affected Length (ft): 0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	2	2

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal: Yes
5.5 Straightening: Straightening
Straightening Length: 1,703
5.5 Dredging: None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Stevens Branch** Reach # **M1.11** Segment: **C** Completion Date: **September 29, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,646** Segment Location: **Starts about 150 upstream of farm bridge and continues to just upstream of trib coming in**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	698	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Hilly	Hilly
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Sometimes	Never
Texture	Sand	Sand

1.5 Valley Features

Valley Width (ft) **531**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **41**

2.2 Max Depth (ft) **3.80**

2.3 Mean Depth (ft) **2.70**

2.4 Floodprone Width (ft) **310**

Notes:

No straightening in this section. Used this segment width to update Ph 1 stream width. It is the best representation of an accurate width, although it has been widenening. Seg B was less widened but has been extensively riprapped. RVW is the road bed.

Step 2. (Contued)

2.5 Aband. Floodpln **6.35** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **15.19**

2.7 Entrenchment Ratio **7.56**

2.8 Incision Ratio **1.67**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **135**

2.12 Substrate Composition

Bedrock	0%
Boulder	1%
Cobble	7%
Coarse Gravel	20%
Fine Gravel	24%
Sand	48%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **45**

2.13 Average Largest Particle on

Bed **3.6** **inches**

Bar **0.9** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Gravel
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Gravel	Gravel
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	268	173
Erosion Height (ft)	6.40	4.16
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	177	312

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Shrubs/Saplin
Sub-dominant	Shrubs/Saplin	Herbaceous

Bank Canopy	Left	Right
Canopy %	1-25	1-25

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	26-50
Sub-dominant	26-50	0-25
W less than 25	1,154	876

Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Deciduous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Crop	Residential
Sub-dominant	None	Hay
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **1**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	1	Road Ditch	0
Other	0	Tile Drain	1
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	7	4

Diagonal	Delta	Island
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
3	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
1	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **489**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.12** Segment: **A** Completion Date: **September 25, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Willard** Why Not assessed: Rain: **No**

Segment Length (ft): **1,910** Segment Location: **Begins just above Morin Rd/Kings Row trib confluence and continues to straightened and**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**800**	**0**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**199**	**0**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Never**
W/in 1 Bankfill	**Sometimes**	**Never**
Texture	**Mixed**	**Mixed**

1.5 Valley Features

Valley Width (ft) **307**

Width Determination **Measured**

Confinement Type **Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **40**

2.2 Max Depth (ft) **3.95**

2.3 Mean Depth (ft) **2.92**

2.4 Floodprone Width (ft) **307**

Notes:

Minimal straightening in this segment. Updated PH 1 width to this segment's width. Field notes said tributary rejuvenation, but this was likely historic not current, due to the processes occurring in this segment. Widening has almost changed this from an E

Step 2. (Contued)

2.5 Aband. Floodpln **4.90** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **13.84**

2.7 Entrenchment Ratio **7.61**

2.8 Incision Ratio **1.24**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **159**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**2** %
Cobble	**11** %
Coarse Gravel	**31** %
Fine Gravel	**18** %
Sand	**38** %
Silt and smaller	**0** %

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **55**

2.13 Average Largest Particle on

Bed **3.2** **inches**

Bar **2.0** **inches**

2.14 Stream Type

Stream Type: **E**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**None**	**0.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	**Sand**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Sand**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**
Bank Erosion	Left	Right
Erosion Length (ft)	**478**	**312**
Erosion Height (ft)	**6.09**	**4.70**
Revetmt. Type	**Rip-Rap**	**Rip-Rap**
Revetmt. Length (ft)	**80**	**172**
Near Bank Veg. Type	Left	Right
Dominant	**Herbaceous**	**Herbaceous**
Sub-dominant	**Shrubs/Saplin**	**Shrubs/Saplin**
Bank Canopy	Left	Right
Canopy %	**26-50**	**1-25**
Mid-Channel Canopy		**Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**>100**	**0-25**
Sub-dominant	**0-25**	**26-50**
W less than 25	**839**	**1,221**
Buffer Veg. Type	Left	Right
Dominant	**Herbaceous**	**Herbaceous**
Sub-dominant	**Shrubs/Saplin**	**Shrubs/Saplin**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Shrubs/Saplin**	**Pasture**
Sub-dominant	**Crop**	**Residential**
Mass Failures	**0**	**0**
Height	**0**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **2**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**1**	Road Ditch	**2**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**0**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
4	**7**	**8**
Diagonal	**Delta**	**Island**
2	**0**	**0**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
4	**0**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **613**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.12** Segment: **B** Completion Date: **September 25, 2008**

Organization: **Redstart Consulting** Observers: **TM, AW** Why Not assessed: Rain: **No**

Segment Length (ft): **1,216** Segment Location: **From beginning of straightened and riprapped section 1895 ft upstream from beginning of**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Corridor Encroachment**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	1,215	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	582	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Never	Never
W/in 1 Bankfill	Never	Never
Texture	Mixed	Mixed

1.5 Valley Features

Valley Width (ft) **355**

Width Determination **Measured**

Confinement Type **Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **30**

2.2 Max Depth (ft) **5.50**

2.3 Mean Depth (ft) **3.18**

2.4 Floodprone Width (ft) **97**

Notes:

All of this segment has been straightened and much of it riprapped along the right bank. Significant development in the upper segment right on the stream bank. Last years flood took out a foot bridge and ran water about 7 feet high. Updated PH 1 to width of seg A.

Step 2. (Contued)

2.5 Aband. Floodpln **8.90** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **9.56**

2.7 Entrenchment Ratio **3.20**

2.8 Incision Ratio **1.62**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **159**

2.12 Substrate Composition

Bedrock	0%
Boulder	1%
Cobble	25%
Coarse Gravel	13%
Fine Gravel	19%
Sand	41%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **6**

2.13 Average Largest Particle on

Bed **3.2** **inches**

Bar **1.2** **inches**

2.14 Stream Type

Stream Type: **E**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	96	53
Erosion Height (ft)	3.82	7.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	33	558

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	None

Bank Canopy	Left	Right
Canopy %	26-50	1-25

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	0-25
Sub-dominant	0-25	None
W less than 25	294	1,015

Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Residential
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	1	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
1	0	4
Diagonal	**Delta**	**Island**
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
3	1	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **995**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.13 Observers: TM, AS Segment Location: 0.14 miles south of the intersection of Farnham Rd and Rte 14, extending upstream to a

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **None**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	1,004	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	631	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Mixed	Mixed

1.5 Valley Features

Valley Width (ft) **380**
Width Determination **Measured**
Confinement Type **Broad**
Rock Gorge? **No**
Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **47**
2.2 Max Depth (ft) **4.65**
2.3 Mean Depth (ft) **2.52**
2.4 Floodprone Width (ft) **380**

Notes:

Widening and aggradation have changed this reference E to C. Incision is historic. Widening is historic and ongoing. Aggredation and planform adjustments are primary processes currently. Buffer areas look like they are abandonned to regenerate.

Step 2. (Contued)

2.5 Aband. Floodpln **6.50** ft.
Human Elev Floodpln **0.00** ft.
2.6 Width/Depth Ratio **18.73**
2.7 Entrenchment Ratio **8.05**
2.8 Incision Ratio **1.40**
Human Elevated Inc Rat **0.00**
2.9 Sinuosity **High**
2.10 Riffles Type **Sedimented**
2.11 Riffle/Step Spacing (ft) **194**

2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	5%
Coarse Gravel	22%
Fine Gravel	27%
Sand	46%
Silt and smaller	0%

Silt/Clay Present? **No**
Detritus **1** %
Large Woody **97**

2.13 Average Largest Particle on

Bed **4.8** **inches**
Bar **2.8** **inches**

2.14 Stream Type

Stream Type: **C**
Bed Material: **Gravel**
Subclass Slope: **None**
Bed Form: **Riffle-Pool**
Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	Multiple	28.33
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	236	689
Erosion Height (ft)	4.54	4.51
Revetmt. Type	None	Rip-Rap
Revetmt. Length (ft)	0	167

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

Bank Canopy	Left	Right
Canopy %	1-25	1-25

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	None	0-25
W less than 25	0	722

Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Herbaceous
Sub-dominant	Shrubs/Saplin	Mixed Trees

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Pasture
Sub-dominant	None	None
Mass Failures	111	58
Height	36	15
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**
4.2 Adjacent Wetlands **Minimal**
4.3 Flow Status **Moderate**
4.4 # of Debris Jams **2**
4.5 Flow Regulation Type **None**
Flow Regulation Use
Impoundments **None**
Impoundmt. Location
4.6 Up/Down strm flow reg **None**
(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	1	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**
Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
7	12	8

Diagonal	Delta	Island
1	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
6	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
4	0	No

5.4 Stream Ford or Animal **No**
5.5 Straightening **Straightening**
Straightening Length: **1,256**
5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.14 Observers: TM, AS Segment Location: From upstream of tributary confluence approximately 0.3 miles downstream from bridge on

April 7, 2009 SGAT Version: 4.56
Segment: 0 Why Not assessed:
Completion Date: September 24, 2008 Rain: No

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **None**
1.2 Alluvial Fan **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	54	0
height	1	0
Roads	884	344
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	560	46

1.4 Adjacent Side	Left	Right
Hillside Slope	Steep	Extremely
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Never	Sometimes
Texture	Not Evalua	Other

1.5 Valley Features
Valley Width (ft) **900**
Width Determination **Measured**
Confinement Type **Very Broad**
Rock Gorge? **No**
Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **24**
2.2 Max Depth (ft) **4.40**
2.3 Mean Depth (ft) **3.44**
2.4 Floodprone Width (ft) **309**

Notes:

Incision is dominant process with localized widening and aggradation. Aggradation is probably due to high erosion on upstream reach and may be tempering the incision happening in this reach (this would explain the moderate IR). Right bank has high

Step 2. (Contued)

2.5 Aband. Floodpln **5.10** ft.
Human Elev Floodpln **0.00** ft.
2.6 Width/Depth Ratio **6.95**
2.7 Entrenchment Ratio **12.94**
2.8 Incision Ratio **1.16**
Human Elevated Inc Rat **0.00**
2.9 Sinuosity **Moderate**
2.10 Riffles Type **Sedimented**
2.11 Riffle/Step Spacing (ft) **0**
2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	0%
Coarse Gravel	17%
Fine Gravel	23%
Sand	60%
Silt and smaller	0%

Silt/Clay Present? **No**
Detritus **1** %
Large Woody **121**
2.13 Average Largest Particle on

Bed	3.0	inches
Bar	1.1	inches

2.14 Stream Type
Stream Type: **E**
Bed Material: **Sand**
Subclass Slope: **None**
Bed Form: **Dune-Ripple**
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	97	19
Erosion Height (ft)	4.41	3.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	224	792
Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Herbaceous	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	26-50	1-25
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	51-100	0-25
Sub-dominant	0-25	26-50
W less than 25	616	225
Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Deciduous	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Residential
Sub-dominant	Hay	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**
4.2 Adjacent Wetlands **Minimal**
4.3 Flow Status **Moderate**
4.4 # of Debris Jams **2**
4.5 Flow Regulation Type **None**
Flow Regulation Use
Impoundments **None**
Impoundmt. Location
4.6 Up/Down strm flow reg **None**
(old) Upstrm Flow Reg **None**
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	2	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**
Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
5	5	11

Diagonal	Delta	Island
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
4	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
1	0	No

5.4 Stream Ford or Animal **No**
5.5 Straightening **Straightening**
Straightening Length: **1,462**
5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.15
Observers: McLane, Smith
Segment Location: Upstream of Rte14 bridge near Falls Bridge Road to downstream of bridge on Brockway Hill

April 7, 2009 SGAT Version: 4.56
Segment: A
Why Not assessed:
Completion Date: September 24, 2008
Rain: No

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	2,655	21
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	758	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Very Steep	Very Steep
Continuous w/	Never	Never
W/in 1 Bankfill	Sometimes	Never
Texture	Not Evalua	Not Evalua

1.5 Valley Features

Valley Width (ft) **1,286**
Width Determination **Measured**
Confinement Type **Very Broad**
Rock Gorge? **No**
Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **29**
2.2 Max Depth (ft) **4.40**
2.3 Mean Depth (ft) **2.76**
2.4 Floodprone Width (ft) **1,286**

Notes:

Meandery stream with poor buffer cover and lots of erosion. Updated PH 1 width to this segment width to reflect a more accurate E stream width. Field notes said yes to tributary rejuvenation, but this is likely to be historic given the processes occurring in this

Passed *Step 2. (Contued)*

2.5 Aband. Floodpln **6.00** ft.
Human Elev Floodpln **0.00** ft.
2.6 Width/Depth Ratio **10.33**
2.7 Entrenchment Ratio **45.12**
2.8 Incision Ratio **1.36**
Human Elevated Inc Rat **0.00**
2.9 Sinuosity **High**
2.10 Riffles Type **Sedimented**
2.11 Riffle/Step Spacing (ft) **127**

2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	6%
Coarse Gravel	34%
Fine Gravel	14%
Sand	46%
Silt and smaller	0%

Silt/Clay Present? **No**
Detritus **1** %
Large Woody **128**

2.13 Average Largest Particle on

Bed **9.4** **inches**
Bar **4.8** **inches**

2.14 Stream Type

Stream Type: **E**
Bed Material: **Gravel**
Subclass Slope: **None**
Bed Form: **Riffle-Pool**
Field Measured Slope:

2.15 Reference Stream Type
(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	781	787
Erosion Height (ft)	3.89	4.34
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	415	313
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	None	None
Bank Canopy	Left	Right
Canopy %	1-25	1-25
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	>100
Sub-dominant	26-50	None
W less than 25	1,328	415
Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Hay	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**
4.2 Adjacent Wetlands **Abundant**
4.3 Flow Status **Moderate**
4.4 # of Debris Jams **1**
4.5 Flow Regulation Type **None**
Flow Regulation Use
Impoundments **None**
Impoundmt. Location
4.6 Up/Down strm flow reg **None**
(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	2
Other	0	Tile Drain	0
Overland Flow	1	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**
Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
10	17	20
Diagonal	Delta	Island
3	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
7	0	1	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
9	0	No

5.4 Stream Ford or Animal **Yes**
5.5 Straightening **Straightening**
Straightening Length: **802**
5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # M1.15 Segment: B
Observers: McLane, McCall Why Not assessed:
Segment Location: From downstream of Brockway Hill Road bridge to tributary confluence downstream of

April 7, 2009 SGAT Version: 4.56
Completion Date: September 26, 2008
Rain: No

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Corridor Encroachment**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	225	0
height	1	0
Roads	734	116
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	473	110

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Very Steep
Continuous w/	Never	Never
W/in 1 Bankfill	Never	Sometimes
Texture	Mixed	Mixed

1.5 Valley Features
Valley Width (ft): 1,141
Width Determination: Measured
Confinement Type: Very Broad
Rock Gorge?: No
Human-caused Change?: Yes

Step 2. Stream Channel

2.1 Bankfull Width: 38
2.2 Max Depth (ft): 4.45
2.3 Mean Depth (ft): 2.41
2.4 Floodprone Width (ft): 1,141

Notes:

Entire length has been straightened and maintained. Flooded garage area in 2006 and new riprap has been put in. No buffer veg in this area at all. Garage owner says water makes it through bridge generally but commonly backs up from downstream rte14

Step 2. (Contued)

2.5 Aband. Floodpln: 6.50 ft.
Human Elev Floodpln: 0.00 ft.
2.6 Width/Depth Ratio: 15.73
2.7 Entrenchment Ratio: 30.11
2.8 Incision Ratio: 1.46
Human Elevated Inc Rat: 0.00
2.9 Sinuosity: Moderate
2.10 Riffles Type: Sedimented
2.11 Riffle/Step Spacing (ft): 92
2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	31%
Coarse Gravel	39%
Fine Gravel	4%
Sand	27%
Silt and smaller	0%

Silt/Clay Present?: No
Detritus: 1 %
Large Woody: 7
2.13 Average Largest Particle on
Bed: 6.1 inches
Bar: 2.4 inches

2.14 Stream Type
Stream Type: C
Bed Material: Gravel
Subclass Slope: None
Bed Form: Riffle-Pool
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)
C 4 Non Riffle-Pool

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: Moderate

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Gravel
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	19	20
Erosion Height (ft)	6.00	3.00
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	128	281

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Bare

Bank Canopy	Left	Right
Canopy %	1-25	0

Mid-Channel Canopy: Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	0-25
Sub-dominant	0-25	26-50
W less than 25	73	471

Buffer Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	None

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Industrial
Sub-dominant	Residential	Residential
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: Minimal
4.2 Adjacent Wetlands: Minimal
4.3 Flow Status: Moderate
4.4 # of Debris Jams: 0
4.5 Flow Regulation Type: None
Flow Regulation Use
Impoundments: None
Impoundmt. Location
4.6 Up/Down strm flow reg: None
(old) Upstrm Flow Reg: None
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams: 0
Affected Length (ft): 0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
2	2	3

Diagonal	Delta	Island
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
2	0	No

5.4 Stream Ford or Animal: No
5.5 Straightening: Straightening
Straightening Length: 849
5.5 Dredging: None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | | April 7, 2009 SGAT Version: 4.56

Stream: **Stevens Branch** Reach # **M1.16** Segment: **A** Completion Date: **September 23, 2008**

Organization: **Redstart Consulting** Observers: **TM, DR, GA, SP, RM etc** Why Not assessed: Rain: **Yes**

Segment Length (ft): **794** Segment Location: **From upstream of trib confluence on Brockway road (by Zamperi Dr) to bottom of series of**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Grade Controls**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**534**	**0**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**0**	**40**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Always**	**Always**
Texture	**Bedrock**	**Mixed**

1.5 Valley Features

Valley Width (ft) **67**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **50**

2.2 Max Depth (ft) **2.85**

2.3 Mean Depth (ft) **1.81**

2.4 Floodprone Width (ft) **67**

Notes:

This segment varies between A and B stream types. The bottom of the segment has some encroachment that might have narrowed the natural valley. Bedrock is common but there is only one grade control. Two old mill sites were found.

Step 2. (Contued)

2.5 Aband. Floodpln **2.85** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **27.62**

2.7 Entrenchment Ratio **1.34**

2.8 Incision Ratio **1.00**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Complete**

2.11 Riffle/Step Spacing (ft) **70**

2.12 Substrate Composition

Bedrock	**14** %
Boulder	**50** %
Cobble	**19** %
Coarse Gravel	**3** %
Fine Gravel	**9** %
Sand	**6** %
Silt and smaller	**0** %

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **86**

2.13 Average Largest Particle on

Bed **13.6** **inches**

Bar **9.0** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Boulder**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope: **4**

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**None**	**0.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Bedrock**	**Bedrock**
Consistency	**Cohesive**	**Cohesive**
Bank Erosion	Left	Right
Erosion Length (ft)	**0**	**17**
Erosion Height (ft)	**0.00**	**3.00**
Revetmt. Type	**Hard Bank**	**Hard Bank**
Revetmt. Length (ft)	**141**	**68**
Near Bank Veg. Type	Left	Right
Dominant	**Deciduous**	**Deciduous**
Sub-dominant	**Herbaceous**	**Coniferous**
Bank Canopy	Left	Right
Canopy %	**76-100**	**76-100**

Mid-Channel Canopy **Closed**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**>100**	**51-100**
Sub-dominant	**None**	**>100**
W less than 25	**0**	**0**
Buffer Veg. Type	Left	Right
Dominant	**Mixed Trees**	**Mixed Trees**
Sub-dominant	**None**	**None**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Forest**	**Forest**
Sub-dominant	**None**	**Residential**
Mass Failures	**0**	**0**
Height	**0**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**0**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**0**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	**0**	**4**
Diagonal	**Delta**	**Island**
0	**0**	**2**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	**0**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **128**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Stevens Branch** Reach # **M1.16** Segment: **B** Completion Date: **September 3, 2008**

Organization: **Redstart Consulting** Observers: **TM, DR, GA, SP, RM etc** Why Not assessed: **bedrock gorge** Rain: **Yes**

Segment Length (ft): **622** Segment Location: **Beginning approximately 800 feet up from private bridge by trib confluence (and near**

QC Status - Staff: Provisional Cons **Passed**

Step 1. Valley and Floodplain

1.1 Segmentation

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	145	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	169	0

1.4 Adjacent Side	Left	Right
Hillside Slope		
Continuous w/		
W/in 1 Bankfill		
Texture		

1.5 Valley Features

Valley Width (ft) **0**

Width Determination

Confinement Type

Rock Gorge?

Human-caused Change?

Step 2. Stream Channel

2.1 Bankfull Width **0**

2.2 Max Depth (ft) **0.00**

2.3 Mean Depth (ft) **0.00**

2.4 Floodprone Width (ft) **0**

Notes:

Step 2. (Contued)

2.5 Aband. Floodpln **0.00** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **0.00**

2.7 Entrenchment Ratio **0.00**

2.8 Incision Ratio **0.00**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity

2.10 Riffles Type

2.11 Riffle/Step Spacing (ft) **0**

2.12 Substrate Composition

Silt/Clay Present?

Detritus **0** %

Large Woody **0**

2.13 Average Largest Particle on

Bed **0.0**

Bar **0.0**

2.14 Stream Type

Stream Type: **A**

Bed Material: **Bedrock**

Subclass Slope: **None**

Bed Form: **Cascade**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope

Bank Texture	Left	Right
Upper		
Material Type		
Consistency		
Lower		
Material Type		
Consistency		

Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Hard Bank	Hard Bank
Revetmt. Length (ft)	59	53

Near Bank Veg. Type	Left	Right
Dominant		
Sub-dominant		

Bank Canopy	Left	Right
Canopy %		
Mid-Channel Canopy		

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant		
Sub-dominant		
W less than 25	0	0

Buffer Veg. Type	Left	Right
Dominant		
Sub-dominant		

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant		
Sub-dominant		
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps

4.2 Adjacent Wetlands

4.3 Flow Status

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **Small**

Flow Regulation Use **Recreation**

Impoundments

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	0

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	

5.4 Stream Ford or Animal **No**

5.5 Straightening **None**

Straightening Length: **0**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.16** Segment: **C** Completion Date: **September 3, 2008**

Organization: **Redstart Consulting** Observers: **TM, DR, GA, SP, etc** Why Not assessed: Rain: **Yes**

Segment Length (ft): **692** Segment Location: **From just downstream of bridge on Circle Street (off Brockway), to top of reach (680 feet).**

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**436**	**67**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**251**	**173**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Sometimes**	**Always**
Texture	**Sand**	**Mixed**

1.5 Valley Features

Valley Width (ft) **60**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **34**

2.2 Max Depth (ft) **3.70**

2.3 Mean Depth (ft) **1.98**

2.4 Floodprone Width (ft) **60**

Notes:

Some sections of C valley here and also possibly a human created valley wall inside of natural valley wall, although this isn't clear. Right bank has total encroachment from road, but this is probably the natural valley wall. Straightening for much of it's length.

Passed *Step 2. (Contued)*

2.5 Aband. Floodpln **4.75** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **17.32**

2.7 Entrenchment Ratio **1.75**

2.8 Incision Ratio **1.28**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **225**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**1** %
Cobble	**11** %
Coarse Gravel	**4** %
Fine Gravel	**32** %
Sand	**52** %
Silt and smaller	**0** %

Silt/Clay Present? **No**

Detritus **2** %

Large Woody **56**

2.13 Average Largest Particle on

Bed **6.7** **inches**

Bar **0.9** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Sand**

Subclass Slope: **c**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**None**	**0.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	**Sand**	**Mix**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Sand**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**44**	**50**
Erosion Height (ft)	**3.00**	**5.00**
Revetmt. Type	**Rip-Rap**	**Rip-Rap**
Revetmt. Length (ft)	**120**	**49**

Near Bank Veg. Type	Left	Right
Dominant	**Herbaceous**	**Shrubs/Saplin**
Sub-dominant	**Shrubs/Saplin**	**Deciduous**

Bank Canopy	Left	Right
Canopy %	**26-50**	**76-100**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**26-50**	**26-50**
Sub-dominant	**>100**	**0-25**
W less than 25	**0**	**436**

Buffer Veg. Type	Left	Right
Dominant	**Shrubs/Saplin**	**Deciduous**
Sub-dominant	**Herbaceous**	**None**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Residential**	**Residential**
Sub-dominant	**Forest**	**None**
Mass Failures	**0**	**0**
Height	**0**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **None**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **1**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **Unknown**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**2**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**0**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
2	**1**	**2**
Diagonal	**Delta**	**Island**
0	**0**	**0**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
2	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	**0**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **411**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** Reach # **T3.01** Segment: **A** Completion Date: **October 13, 2008**

Organization: **Redstart Consulting** Observers: **DR, AS, TM** Why Not assessed: Rain: **Yes**

Segment Length (ft): **902** Segment Location: **From confluence of Jail Branch and Stevens Branch to just upstream of bridge on Ayers**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Corridor Encroachment**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	237
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	834

1.4 Adjacent Side	Left	Right
Hillside Slope	Flat	Flat
Continuous w/	Never	Never
W/in 1 Bankfill	Always	Always
Texture	Other	Other

1.5 Valley Features

Valley Width (ft) **970**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **40**

2.2 Max Depth (ft) **4.50**

2.3 Mean Depth (ft) **3.58**

2.4 Floodprone Width (ft) **51**

Notes:

Very developed on edges and mostly likely has been totally straightened and periodically dredged. Railroad bridge has one pier in the middle, and one side functions only at high flows due to sedimentation. Barre City engineer highlighted this area for ongoing

Step 2. (Contued)

2.5 Aband. Floodpln **14.50** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **11.17**

2.7 Entrenchment Ratio **1.27**

2.8 Incision Ratio **3.22**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Not Applicable**

2.11 Riffle/Step Spacing (ft) **0**

2.12 Substrate Composition

Bedrock	0%
Boulder	4%
Cobble	41%
Coarse Gravel	27%
Fine Gravel	16%
Sand	13%
Silt and smaller	0%

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **25**

2.13 Average Largest Particle on

Bed **12.0** **inches**

Bar **5.0** **inches**

2.14 Stream Type

Stream Type: **F**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Plane Bed**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	0	218
Erosion Height (ft)	0.00	4.54
Revetmt. Type	Multiple	Multiple
Revetmt. Length (ft)	652	586

Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Invasives
Sub-dominant	Invasives	Shrubs/Saplin

Bank Canopy	Left	Right
Canopy %	1-25	1-25

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	26-50	26-50
W less than 25	583	656

Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Deciduous	Deciduous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Industrial	Commercial
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	2

Diagonal	Delta	Island
0	1	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
1	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **889**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** Reach # **T3.01** Segment: **B** Completion Date: **October 4, 2008**

Organization: **Redstart Consulting** Observers: **DR, AS** Why Not assessed: Rain: **Yes**

Segment Length (ft): **2,572** Segment Location: **From approximately 265 feet upstream of the Main Street bridge, to the top of the reach,**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	212	0
height	5	0
Roads	734	1,357
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	287	2,219

1.4 Adjacent Side	Left	Right
Hillside Slope	Very Steep	Very Steep
Continuous w/	Always	Sometimes
W/in 1 Bankfill	Always	Sometimes
Texture	Sand	Sand

1.5 Valley Features

Valley Width (ft) **968**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **61**

2.2 Max Depth (ft) **4.75**

2.3 Mean Depth (ft) **3.64**

2.4 Floodprone Width (ft) **968**

Notes:

Probably has been mostly straightened and past dredging is likely. Spaulding playing fields on the right bak offer only floodplain access in a reach that likely offered extensive floodplain historically. Berm along playing fields just barely under flood prone height.

Step 2. (Contued)

2.5 Aband. Floodpln **7.15** ft.

Human Elev Floodpln **9.45** ft.

2.6 Width/Depth Ratio **16.76**

2.7 Entrenchment Ratio **15.87**

2.8 Incision Ratio **1.51**

Human Elevated Inc Rat **1.99**

2.9 Sinuosity **Low**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **40**

2.12 Substrate Composition

Bedrock	0%
Boulder	3%
Cobble	36%
Coarse Gravel	25%
Fine Gravel	10%
Sand	17%
Silt and smaller	9%

Silt/Clay Present? **Yes**

Detritus **2** %

Large Woody **7**

2.13 Average Largest Particle on

Bed **10.0** **inches**

Bar **5.0** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	One	20.00
Gullies	One	20.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Sand	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	0	212
Erosion Height (ft)	0.00	4.61
Revetmt. Type	Multiple	Rip-Rap
Revetmt. Length (ft)	1,708	569
Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Deciduous	Deciduous
Bank Canopy	Left	Right
Canopy %	26-50	26-50
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	26-50	26-50
W less than 25	1,659	1,670
Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Deciduous	Deciduous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Commercial	Residential
Sub-dominant	None	None
Mass Failures	0	104
Height	0	20
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	1	Road Ditch	3
Other	0	Tile Drain	1
Overland Flow	0	Urb Strm Wtr Pipe	4

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	3	6
Diagonal	**Delta**	**Island**
1	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
3	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **2,239**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # T3.02 | Observers: McLane, Ruddell | Segment Location: Beginning approximately 600 feet upstream of the Ayers Street bridge to just upstream of

April 7, 2009 SGAT Version: 4.56
Segment: A | Why Not assessed: | Completion Date: October 15, 2008
Rain: Yes

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Grade Controls**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	162	388
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	619	410

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Always	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Bedrock	Boulder

1.5 Valley Features
Valley Width (ft): 81
Width Determination: Measured
Confinement Type: Narrowly
Rock Gorge?: Yes
Human-caused Change?: No

Step 2. Stream Channel

2.1 Bankfull Width: 73
2.2 Max Depth (ft): 3.55
2.3 Mean Depth (ft): 2.58
2.4 Floodprone Width (ft): 81

Notes:

Probably no straightening or dredging here. There was probably a mill at the top of the bedrock falls, historically. This segment is dominated by a falls at the top of the segment which is likely in reference condition but the cross-section was taken lower in the segment

Step 2. (Contued)

2.5 Aband. Floodpln: 3.55 ft.
Human Elev Floodpln: 0.00 ft.
2.6 Width/Depth Ratio: 28.22
2.7 Entrenchment Ratio: 1.11
2.8 Incision Ratio: 1.00
Human Elevated Inc Rat: 0.00
2.9 Sinuosity: Low
2.10 Riffles Type: Complete
2.11 Riffle/Step Spacing (ft): 100
2.12 Substrate Composition

Bedrock	10%
Boulder	32%
Cobble	21%
Coarse Gravel	11%
Fine Gravel	6%
Sand	20%
Silt and smaller	0%

Silt/Clay Present?: No
Detritus: 1 %
Large Woody: 16
2.13 Average Largest Particle on
Bed: 12.2 inches
Bar: 8.0 inches

2.14 Stream Type
Stream Type: F
Bed Material: Cobble
Subclass Slope: None
Bed Form: Step-Pool
Field Measured Slope:
2.15 Reference Stream Type
(if different from Phase 1)
B 3 Non Step-Pool

3.3 old	Amount	Mean Height
Failures	Multiple	31.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: Steep

Bank Texture	Left	Right
Upper		
Material Type	Bedrock	Boulder/Cobbl
Consistency	Cohesive	Non-cohesive
Lower		
Material Type	Bedrock	Boulder/Cobbl
Consistency	Cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	54	0
Erosion Height (ft)	3.00	0.00
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0

Near Bank Veg. Type	Left	Right
Dominant	Coniferous	Herbaceous
Sub-dominant	Deciduous	Coniferous

Bank Canopy	Left	Right
Canopy %	76-100	76-100
Mid-Channel Canopy		Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	51-100	>100
Sub-dominant	None	51-100
W less than 25	0	83

Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Mixed Trees
Sub-dominant	None	None

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	Residential	Residential
Mass Failures	63	78
Height	22	45
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: Abundant
4.2 Adjacent Wetlands: None
4.3 Flow Status: Moderate
4.4 # of Debris Jams: 0
4.5 Flow Regulation Type: None
Flow Regulation Use
Impoundments: Unknown
Impoundmt. Location
4.6 Up/Down strm flow reg: None
(old) Upstrm Flow Reg: Unknown
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams: 0
Affected Length (ft): 0

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	8

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal: No
5.5 Straightening: None
Straightening Length: 0
5.5 Dredging: None

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** Reach # **T3.02** Segment: **B** Completion Date: **October 13, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Smith, Ruddell** Why Not assessed: Rain: **Yes**

Segment Length (ft): **6,447** Segment Location: **Fromn top of bedrock gorge to just west of Messier Road (off Rte 302) and upstream of a**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Grade Controls**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**4,427**	**663**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**2,156**	**650**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Sometimes**	**Sometimes**
Texture	**Mixed**	**Other**

1.5 Valley Features

Valley Width (ft) **126**

Width Determination **Measured**

Confinement Type **Semi-confined**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **67**

2.2 Max Depth (ft) **4.00**

2.3 Mean Depth (ft) **2.74**

2.4 Floodprone Width (ft) **126**

Notes:

Some B some C valley. Developed on both sides in lower segment, only on RB in upper segment. Some areas entrenched, mostly historically incised and newly created small floodplain terraces. Used old terrace as IR since stream is in stage IV, still stabilizing.

Step 2. (Contued)

2.5 Aband. Floodpln **13.33** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **24.27**

2.7 Entrenchment Ratio **1.89**

2.8 Incision Ratio **3.33**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **200**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**15** %
Cobble	**45** %
Coarse Gravel	**20** %
Fine Gravel	**10** %
Sand	**10** %
Silt and smaller	**0** %

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **34**

2.13 Average Largest Particle on

Bed **11.0** **inches**

Bar **4.3** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Cobble**

Subclass Slope: **c**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**Multiple**	**22.67**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Boulder/Cobbl**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**972**	**135**
Erosion Height (ft)	**4.28**	**3.90**
Revetmt. Type	**Rip-Rap**	**Rip-Rap**
Revetmt. Length (ft)	**240**	**2,396**

Near Bank Veg. Type	Left	Right
Dominant	**Deciduous**	**Herbaceous**
Sub-dominant	**Herbaceous**	**Deciduous**

Bank Canopy	Left	Right
Canopy %	**76-100**	**51-75**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**>100**	**0-25**
Sub-dominant	**51-100**	**51-100**
W less than 25	**820**	**1,808**

Buffer Veg. Type	Left	Right
Dominant	**Mixed Trees**	**Mixed Trees**
Sub-dominant	**None**	**Herbaceous**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Forest**	**Residential**
Sub-dominant	**None**	**Forest**
Mass Failures	**180**	**0**
Height	**24**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**7**
Other	**0**	Tile Drain	**0**
Overland Flow	**3**	Urb Strm Wtr Pipe	**1**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
10	**12**	**17**

Diagonal	Delta	Island
1	**2**	**0**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
4	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
7	**0**	**Yes**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **3,193**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Honey Brook** Reach # **T3.02S4.01** Segment: **A** Completion Date: **September 8, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,949** Segment Location: **Beginning at the confluence of Honey Brook and the Jail Branch, approximately 1065 north**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	210	0
height	6	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	328	50

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Mixed	Mixed

1.5 Valley Features

Valley Width (ft) **112**

Width Determination **Estimated**

Confinement Type **Semi-confined**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **41**

2.2 Max Depth (ft) **3.50**

2.3 Mean Depth (ft) **2.17**

2.4 Floodprone Width (ft) **91**

Notes:

Heavily impacted by flooding in 2007 and 2008; houses at base of reach were bought out and removed summer 2008, but new owner of the old Dugout Restaurant (purchased after flooding) did not participate and is intending to renovate.

Step 2. (Contued)

2.5 Aband. Floodpln **3.50** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **18.89**

2.7 Entrenchment Ratio **2.22**

2.8 Incision Ratio **1.00**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **20**

2.12 Substrate Composition

Bedrock	0%
Boulder	22%
Cobble	37%
Coarse Gravel	20%
Fine Gravel	3%
Sand	14%
Silt and smaller	4%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **67**

2.13 Average Largest Particle on

Bed **16.8** **inches**

Bar **9.0** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Cobble**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

B 3 Non Step-Pool

3.3 old	Amount	Mean Height
Failures	Multiple	41.71
Gullies	One	30.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Mix	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Mix	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	103	131
Erosion Height (ft)	6.00	7.28
Revetmt. Type	Rip-Rap	Hard Bank
Revetmt. Length (ft)	166	166
Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Deciduous
Sub-dominant	Coniferous	Herbaceous
Bank Canopy	Left	Right
Canopy %	26-50	51-75
Mid-Channel Canopy		Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	0-25	0-25
W less than 25	232	451
Buffer Veg. Type	Left	Right
Dominant	Coniferous	Mixed Trees
Sub-dominant	Herbaceous	Herbaceous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	Bare	Bare
Mass Failures	660	394
Height	40	53
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **5**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	3	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	6	15
Diagonal	**Delta**	**Island**
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
4	0	1	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **1,148**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Honey Brook** Reach # **T3.02S4.01** Segment: **B** Completion Date: **September 8, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, Andrews, Currier** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,285** Segment Location: **Rte. 302 confluence with Jail Branch to trib confluence DS of E/W Cobble Hill Rd.**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	53

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Mixed	Mixed

1.5 Valley Features

Valley Width (ft) **40**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **28**

2.2 Max Depth (ft) **3.00**

2.3 Mean Depth (ft) **1.29**

2.4 Floodprone Width (ft) **35**

Notes:

E. Cobble Hill Rd. culvert is a severe channel and floodprone constriction and likely requires sediment/debris removal after floods significant stormwater inputs from upstream; tributary off RB is very steep and shows evidence of significant mass failures, appears

Step 2. (Contued)

2.5 Aband. Floodpln **3.00** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **21.63**

2.7 Entrenchment Ratio **1.26**

2.8 Incision Ratio **1.00**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **25**

2.12 Substrate Composition

Bedrock	5%
Boulder	11%
Cobble	25%
Coarse Gravel	20%
Fine Gravel	9%
Sand	30%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **2** %

Large Woody **58**

2.13 Average Largest Particle on

Bed **17.4** **inches**

Bar **10.0** **inches**

2.14 Stream Type

Stream Type: **F**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	One	20.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Mix	Mix
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Bedrock	Boulder/Cobbl
Consistency	Cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	40	175
Erosion Height (ft)	5.00	3.63
Revetmt. Type	None	Rip-Rap
Revetmt. Length (ft)	0	31

Near Bank Veg. Type	Left	Right
Dominant	Coniferous	Coniferous
Sub-dominant	Herbaceous	Herbaceous

Bank Canopy	Left	Right
Canopy %	76-100	76-100

Mid-Channel Canopy **Closed**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	51-100	None
W less than 25	0	0

Buffer Veg. Type	Left	Right
Dominant	Coniferous	Coniferous
Sub-dominant	None	None

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	Residential	Residential
Mass Failures	39	0
Height	20	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Low**

4.4 # of Debris Jams **2**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
2	0	4
Diagonal	**Delta**	**Island**
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	2	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
1	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **190**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Honey Brook** Reach # **T3.02S4.02** Segment: **A** Completion Date: **September 22, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Why Not assessed: Rain: **No**

Segment Length (ft): **651** Segment Location: **Beginning just upstream of Cobble Hill Road crossing, and continuing 690 feet upstream.**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	84
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	0	306

1.4 Adjacent Side	Left	Right
Hillside Slope	Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Always
Texture	Silt/Clay	Silt/Clay

1.5 Valley Features

Valley Width (ft) **36**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **24**

2.2 Max Depth (ft) **2.30**

2.3 Mean Depth (ft) **1.46**

2.4 Floodprone Width (ft) **36**

Notes:

deep historic incision augmented by channelization at road crossing (elevated transverse roadway with a 4 ft culvert at the bottom, perched/cascade on DS end); significant urban stormwater inputs in this segment and likely loss of wetland

Step 2. (Contued)

2.5 Aband. Floodpln **8.70** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **16.30**

2.7 Entrenchment Ratio **1.53**

2.8 Incision Ratio **3.78**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **20**

2.12 Substrate Composition

Bedrock	1%
Boulder	8%
Cobble	18%
Coarse Gravel	16%
Fine Gravel	14%
Sand	43%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **26**

2.13 Average Largest Particle on

Bed **9.4** **inches**

Bar **4.6** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Gravel**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Silt
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	21	113
Erosion Height (ft)	8.00	3.53
Revetmt. Type	None	Rip-Rap
Revetmt. Length (ft)	0	58
Near Bank Veg. Type	Left	Right
Dominant	Deciduous	Herbaceous
Sub-dominant	Herbaceous	Shrubs/Saplin
Bank Canopy	Left	Right
Canopy %	76-100	76-100
Mid-Channel Canopy	Closed	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	26-50	26-50
Sub-dominant	0-25	None
W less than 25	234	0
Buffer Veg. Type	Left	Right
Dominant	Deciduous	Deciduous
Sub-dominant	Shrubs/Saplin	Herbaceous

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Residential	Residential
Sub-dominant	None	Hay
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **None**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Low**

4.4 # of Debris Jams **2**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	1
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	1

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
2	2	3
Diagonal	**Delta**	**Island**
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **128**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Honey Brook** Reach # **T3.02S4.02** Segment: **B** Completion Date: **September 23, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Why Not assessed: Rain: **No**

Segment Length (ft): **6,289** Segment Location: **Beginning approximately 700 feet upstream of E/W Cobble Hill Road intersection and**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	178
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	227	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Silt/Clay	Silt/Clay

1.5 Valley Features

Valley Width (ft) **144**

Width Determination **Measured**

Confinement Type **Very Broad**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **15**

2.2 Max Depth (ft) **2.30**

2.3 Mean Depth (ft) **1.10**

2.4 Floodprone Width (ft) **144**

Notes:

Altered wetlands: large portions likely ditched historically for agricultural use, also channelized at road crossings; historic beaver impoundments also possible but not currently evident. Most of the segment appears as a linear palustrine wetland on VSWI maps, but

Step 2. (Contued)

2.5 Aband. Floodpln **4.20** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **13.64**

2.7 Entrenchment Ratio **9.60**

2.8 Incision Ratio **1.83**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **High**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **40**

2.12 Substrate Composition

Bedrock	0%
Boulder	0%
Cobble	4%
Coarse Gravel	22%
Fine Gravel	15%
Sand	59%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **51**

2.13 Average Largest Particle on

Bed **5.0** **inches**

Bar **3.2** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Sand**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Undercut**

Bank Texture	Left	Right
Upper		
Material Type	Silt	Silt
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Silt	Silt
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	72	72
Erosion Height (ft)	2.00	3.84
Revetmt. Type	None	None
Revetmt. Length (ft)	0	0

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Deciduous	Deciduous

Bank Canopy	Left	Right
Canopy %	26-50	26-50

Mid-Channel Canopy **Closed**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	51-100	51-100
Sub-dominant	>100	26-50
W less than 25	1,334	1,231

Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Herbaceous
Sub-dominant	Herbaceous	Mixed Trees

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Pasture
Sub-dominant	Residential	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Abundant**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **5**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	2	6

Diagonal	Delta	Island
0	1	1

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
7	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
3	0	No

5.4 Stream Ford or Animal **Yes**

5.5 Straightening **Straightening**

Straightening Length: **550**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** | Reach # **T3.03** | Segment: **A** | Completion Date: **October 15, 2008**

Organization: **Redstart Consulting** | Observers: **McLane, Ruddell** | Why Not assessed: | Rain: **Yes**

Segment Length (ft): **4,743** | Segment Location: **From upstream of private bridge west of Messier Road to approximately 3220 feet upstream**

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation **Substrate Size**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**3,266**	**371**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**2,368**	**661**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Very Steep**	**Very Steep**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Sometimes**	**Sometimes**
Texture	**Cobble**	**Cobble**

1.5 Valley Features

Valley Width (ft) **330**

Width Determination **Measured**

Confinement Type **Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **50**

2.2 Max Depth (ft) **3.75**

2.3 Mean Depth (ft) **2.32**

2.4 Floodprone Width (ft) **329**

Notes:

Probably dredging in the vicinity of the bridge. Straightening where ever there is riprap. Alternates floodplain access with valley wall constriction on opposite sides. Rte 302 has narrowed valley. Much of development, particularly left bank, has gravel parking lots

Passed *Step 2. (Contued)*

2.5 Aband. Floodpln **6.35** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **21.51**

2.7 Entrenchment Ratio **6.59**

2.8 Incision Ratio **1.69**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Sedimented**

2.11 Riffle/Step Spacing (ft) **205**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**7** %
Cobble	**51** %
Coarse Gravel	**24** %
Fine Gravel	**4** %
Sand	**14** %
Silt and smaller	**0** %

Silt/Clay Present? **Yes**

Detritus **2** %

Large Woody **61**

2.13 Average Largest Particle on

Bed **9.7** **inches**

Bar **3.9** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Cobble**

Subclass Slope: **None**

Bed Form: **Riffle-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**Multiple**	**81.67**
Gullies	**One**	**2.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	**Sand**	**Sand**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**23**	**95**
Erosion Height (ft)	**10.00**	**4.35**
Revetmt. Type	**Rip-Rap**	**Rip-Rap**
Revetmt. Length (ft)	**194**	**877**

Near Bank Veg. Type	Left	Right
Dominant	**Shrubs/Saplin**	**Shrubs/Saplin**
Sub-dominant	**Herbaceous**	**Herbaceous**

Bank Canopy	Left	Right
Canopy %	**26-50**	**26-50**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**51-100**	**>100**
Sub-dominant	**0-25**	**0-25**
W less than 25	**685**	**1,571**

Buffer Veg. Type	Left	Right
Dominant	**Mixed Trees**	**Mixed Trees**
Sub-dominant	**Herbaceous**	**Shrubs/Saplin**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Commercial**	**Forest**
Sub-dominant	**Residential**	**Residential**
Mass Failures	**26**	**175**
Height	**20**	**179**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Abundant**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **4**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**5**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**0**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
3	**7**	**12**

Diagonal	Delta	Island
0	**1**	**1**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
8	**0**	**1**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
4	**0**	**Yes**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **1,378**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** Reach # **T3.03** Segment: **B** Completion Date: **October 15, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Ruddell** Why Not assessed: Rain: **Yes**

Segment Length (ft): **764** Segment Location: **From upstream of Rte 302 bridge near McGlaughlin road where mass failures start on right**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Substrate Size**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	317	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Very Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Other	Mixed

1.5 Valley Features

Valley Width (ft) **182**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **43**

2.2 Max Depth (ft) **4.30**

2.3 Mean Depth (ft) **2.46**

2.4 Floodprone Width (ft) **182**

Notes:

Short section of steeper slope and more bouldery substrate. Transition from C to B valley. Very top of segment has no flooding room at all. Left bank area has been filled with rubble.

Step 2. (Contued)

2.5 Aband. Floodpln **5.30** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **17.28**

2.7 Entrenchment Ratio **4.29**

2.8 Incision Ratio **1.23**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Eroded**

2.11 Riffle/Step Spacing (ft) **25**

2.12 Substrate Composition

Bedrock	0%
Boulder	48%
Cobble	37%
Coarse Gravel	5%
Fine Gravel	5%
Sand	5%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **2** %

Large Woody **7**

2.13 Average Largest Particle on

Bed **13.2** **inches**

Bar **7.1** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Cobble**

Subclass Slope: **b**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	Multiple	107.50
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Rip-Rap	None
Revetmt. Length (ft)	305	0

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Coniferous
Sub-dominant	Deciduous Shrubs/Saplin	

Bank Canopy	Left	Right
Canopy %	76-100	76-100
Mid-Channel Canopy	Open	

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	26-50	>100
Sub-dominant	51-100	None
W less than 25	112	0

Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Mixed Trees
Sub-dominant	Herbaceous	None

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Commercial	Forest
Sub-dominant	None	None
Mass Failures	0	235
Height	0	169
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **2**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
1	1	0
Diagonal	**Delta**	**Island**
0	0	1

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **396**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch** | **Phase 2 Segment Summary** | April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** | Reach # **T3.04** | Segment: **A** | Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** | Observers: **McLane, Goodwin** | Why Not assessed: | Rain: **Yes**

Segment Length (ft): **1,828** | Segment Location: **Upstream of trib confluence that enters just downstream of Quarry Hill Mini Storage to point**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	0	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	620	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Never	Sometimes
W/in 1 Bankfill	Sometimes	Sometimes
Texture	Other	Silt/Clay

1.5 Valley Features

Valley Width (ft) **112**

Width Determination **Measured**

Confinement Type **Semi-confined**

Rock Gorge? **No**

Human-caused Change? **No**

Step 2. Stream Channel

2.1 Bankfull Width **51**

2.2 Max Depth (ft) **3.75**

2.3 Mean Depth (ft) **2.62**

2.4 Floodprone Width (ft) **122**

Notes:

Small amount of incision here. Seems fine sediments move through this segment due to increased slope and substrate stability in stream. Planform adjustment might be key here, MFs are extensive. Cross section is a slightly wider, less entrenched part of the

Step 2. (Contued)

2.5 Aband. Floodpln **4.45** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **19.31**

2.7 Entrenchment Ratio **2.41**

2.8 Incision Ratio **1.19**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Complete**

2.11 Riffle/Step Spacing (ft) **40**

2.12 Substrate Composition

Bedrock	0%
Boulder	61%
Cobble	28%
Coarse Gravel	6%
Fine Gravel	1%
Sand	4%
Silt and smaller	0%

Silt/Clay Present? **Yes**

Detritus **1** %

Large Woody **24**

2.13 Average Largest Particle on

Bed **22.0** **inches**

Bar **6.0** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Boulder**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	Multiple	125.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Steep**

Bank Texture	Left	Right
Upper		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	110	0
Erosion Height (ft)	3.00	0.00
Revetmt. Type	Rip-Rap	None
Revetmt. Length (ft)	75	0

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Coniferous	Coniferous

Bank Canopy	Left	Right
Canopy %	76-100	76-100

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	>100
Sub-dominant	51-100	None
W less than 25	0	0

Buffer Veg. Type	Left	Right
Dominant	Mixed Trees	Mixed Trees
Sub-dominant	Shrubs/Saplin	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Forest	Forest
Sub-dominant	Commercial	Bare
Mass Failures	0	809
Height	0	115
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **1**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
4	3	2

Diagonal	Delta	Island
0	1	3

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
3	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **None**

Straightening Length: **0**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Jail Branch** Reach # **T3.04** Segment: **B** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,111** Segment Location: **From a point on the stream roughly due west of Pelletiers Car Wash where the stream**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**430**	**160**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**629**	**91**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Extremely**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Always**	**Always**
Texture	**Other**	**Boulder**

1.5 Valley Features

Valley Width (ft) **67**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **53**

2.2 Max Depth (ft) **4.10**

2.3 Mean Depth (ft) **2.04**

2.4 Floodprone Width (ft) **67**

Notes:

Probably was dredged in vicinity of bridge? Encroachment has changed valley but it is hard to tell how much. There is some A slope, but over all is and probably always was a B stream. Erosion indicates some incision and widening. Not much aggredation except near

Step 2. (Contued)

2.5 Aband. Floodpln **4.10** ft.

Human Elev Floodpln **30.00** ft.

2.6 Width/Depth Ratio **25.98**

2.7 Entrenchment Ratio **1.27**

2.8 Incision Ratio **1.00**

Human Elevated Inc Rat **7.32**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Eroded**

2.11 Riffle/Step Spacing (ft) **20**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**84** %
Cobble	**12** %
Coarse Gravel	**3** %
Fine Gravel	**0** %
Sand	**1** %
Silt and smaller	**0** %

Silt/Clay Present? **No**

Detritus **3** %

Large Woody **29**

2.13 Average Largest Particle on

Bed **25.2** **inches**

Bar **N/A** **inches**

2.14 Stream Type

Stream Type: **F**

Bed Material: **Boulder**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**One**	**100.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**0**	**99**
Erosion Height (ft)	**0.00**	**4.00**
Revetmt. Type	**Rip-Rap**	**Rip-Rap**
Revetmt. Length (ft)	**890**	**256**

Near Bank Veg. Type	Left	Right
Dominant	**Deciduous**	**Herbaceous**
Sub-dominant	**Shrubs/Saplin**	**Deciduous**

Bank Canopy	Left	Right
Canopy %	**51-75**	**76-100**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**26-50**	**>100**
Sub-dominant	**0-25**	**None**
W less than 25	**419**	**72**

Buffer Veg. Type	Left	Right
Dominant	**Mixed Trees**	**Mixed Trees**
Sub-dominant	**Invasives**	**None**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Commercial**	**Forest**
Sub-dominant	**Bare**	**None**
Mass Failures	**0**	**181**
Height	**0**	**100**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **5**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **None**

Impoundmt. Location

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **None**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**1**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**0**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
1	**0**	**4**
Diagonal	**Delta**	**Island**
0	**0**	**0**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
3	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	**1**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **812**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Jail Branch** Reach # **T3.04** Segment: **C** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,341** Segment Location: **From above bridge on Rte 302 (at intersection of old and new Rte 302) to approximately**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Channel Dimensions**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	543	790
height	8	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	200	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Flat
Continuous w/	Sometimes	Always
W/in 1 Bankfill	Always	Always
Texture	Other	Boulder

1.5 Valley Features

Valley Width (ft) **321**

Width Determination **Measured**

Confinement Type **Broad**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **49**

2.2 Max Depth (ft) **4.30**

2.3 Mean Depth (ft) **2.69**

2.4 Floodprone Width (ft) **321**

Notes:

Extensive riprap and was probably windrowed. Some incision but this segment has flood plain. No very distinct process.

Step 2. (Contued)

2.5 Aband. Floodpln **6.00** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **18.25**

2.7 Entrenchment Ratio **6.54**

2.8 Incision Ratio **1.40**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Moderate**

2.10 Riffles Type **Eroded**

2.11 Riffle/Step Spacing (ft) **30**

2.12 Substrate Composition

Bedrock	0%
Boulder	60%
Cobble	25%
Coarse Gravel	8%
Fine Gravel	3%
Sand	4%
Silt and smaller	0%

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **2**

2.13 Average Largest Particle on

Bed **23.0** **inches**

Bar **N/A** **inches**

2.14 Stream Type

Stream Type: **C**

Bed Material: **Boulder**

Subclass Slope: **b**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

C **2** **b** **Step-Pool**

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive

Bank Erosion	Left	Right
Erosion Length (ft)	0	35
Erosion Height (ft)	0.00	3.05
Revetmt. Type	Rip-Rap	Rip-Rap
Revetmt. Length (ft)	494	425

Near Bank Veg. Type	Left	Right
Dominant	Herbaceous	Herbaceous
Sub-dominant	Shrubs/Saplin	Deciduous

Bank Canopy	Left	Right
Canopy %	51-75	76-100

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	>100
Sub-dominant	26-50	0-25
W less than 25	438	319

Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Mixed Trees
Sub-dominant	Deciduous	None

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Residential	Forest
Sub-dominant	None	None
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Abundant**

4.2 Adjacent Wetlands **Minimal**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **1**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **Small**

Impoundmt. Location **Upstream**

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **Unknown**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	2
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	0

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
5	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	Yes

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **1,341**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Jail Branch** Reach # **T3.04** Segment: **D** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Why Not assessed: Rain: **Yes**

Segment Length (ft): **819** Segment Location: **From approximately 1350 feet upstream of bridge on 302 (at intersection of old and new**

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation **Corridor Encroachment**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	389	335
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	457	0

1.4 Adjacent Side	Left	Right
Hillside Slope	Extremely	Extremely
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Other	Other

1.5 Valley Features

Valley Width (ft) **133**

Width Determination **Measured**

Confinement Type **Semi-confined**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **59**

2.2 Max Depth (ft) **3.50**

2.3 Mean Depth (ft) **2.35**

2.4 Floodprone Width (ft) **77**

Notes:

Entire length has been straightened and riprapped. The valley on both sides has been filled. Fill levels are variable on the LB, some being lower than this xsection. At the site of the xs, the LB fill was at 9 ft. Fill on the RB is higher, measuring 15 feet. Substrate

Step 2. (Contued)

2.5 Aband. Floodpln **9.00** ft.

Human Elev Floodpln **9.00** ft.

2.6 Width/Depth Ratio **25.11**

2.7 Entrenchment Ratio **1.30**

2.8 Incision Ratio **2.57**

Human Elevated Inc Rat **2.57**

2.9 Sinuosity **Low**

2.10 Riffles Type **Eroded**

2.11 Riffle/Step Spacing (ft) **50**

2.12 Substrate Composition

Bedrock	0%
Boulder	53%
Cobble	30%
Coarse Gravel	10%
Fine Gravel	0%
Sand	7%
Silt and smaller	0%

Silt/Clay Present? **No**

Detritus **1** %

Large Woody **10**

2.13 Average Largest Particle on

Bed **24.2** **inches**

Bar **N/A** **inches**

2.14 Stream Type

Stream Type: **F**

Bed Material: **Boulder**

Subclass Slope: **None**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Rip-Rap	Multiple
Revetmt. Length (ft)	749	706
Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Deciduous	Bare
Bank Canopy	Left	Right
Canopy %	76-100	26-50
Mid-Channel Canopy		Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	0-25	0-25
Sub-dominant	26-50	26-50
W less than 25	309	641
Buffer Veg. Type	Left	Right
Dominant	Deciduous	Mixed Trees
Sub-dominant	None	Invasives

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Commercial	Commercial
Sub-dominant	Bare	Forest
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **Small**

Impoundmt. Location **Upstream**

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **Unknown**

4.7 StormwaterInputs

Field Ditch	0	Road Ditch	2
Other	0	Tile Drain	0
Overland Flow	3	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
1	0	1
Diagonal	**Delta**	**Island**
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **798**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Project: **Stevens Branch**

Phase 2 Segment Summary

April 7, 2009 SGAT Version: 4.56

Stream: **Jail Branch** Reach # **T3.05** Segment: **A** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane** Why Not assessed: Rain: **Yes**

Segment Length (ft): **1,515** Segment Location: **From abandonned mill just downstream of the Route 10 bridge to approximately 1365 feet**

QC Status - Staff: Provisional Cons

Step 1. Valley and Floodplain

1.1 Segmentation **Planform and Scope**

1.2 Alluvial Fan **None**

1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	**0**	**0**
height	**0**	**0**
Roads	**1,110**	**119**
height	**0**	**0**
Railroads	**0**	**0**
height	**0**	**0**
Improved Paths	**0**	**0**
height	**0**	**0**
Development	**850**	**520**

1.4 Adjacent Side	Left	Right
Hillside Slope	**Extremely**	**Hilly**
Continuous w/	**Sometimes**	**Sometimes**
W/in 1 Bankfill	**Always**	**Always**
Texture	**Other**	**Boulder**

1.5 Valley Features

Valley Width (ft) **116**

Width Determination **Measured**

Confinement Type **Narrowly**

Rock Gorge? **No**

Human-caused Change? **Yes**

Step 2. Stream Channel

2.1 Bankfull Width **59**

2.2 Max Depth (ft) **4.20**

2.3 Mean Depth (ft) **2.56**

2.4 Floodprone Width (ft) **116**

Notes:

Downstream of flood control dam and old stream gage site. Heavily riprapped, particularly on the LB, which has a build up floodplain. Downstream end has bridge and old dam constrictions.

Passed *Step 2. (Contued)*

2.5 Aband. Floodpln **7.80** ft.

Human Elev Floodpln **0.00** ft.

2.6 Width/Depth Ratio **22.97**

2.7 Entrenchment Ratio **1.97**

2.8 Incision Ratio **1.86**

Human Elevated Inc Rat **0.00**

2.9 Sinuosity **Low**

2.10 Riffles Type **Complete**

2.11 Riffle/Step Spacing (ft) **69**

2.12 Substrate Composition

Bedrock	**0** %
Boulder	**53** %
Cobble	**34** %
Coarse Gravel	**8** %
Fine Gravel	**0** %
Sand	**5** %
Silt and smaller	**0** %

Silt/Clay Present? **No**

Detritus **5** %

Large Woody **35**

2.13 Average Largest Particle on

Bed **17.5** **inches**

Bar **10.4** **inches**

2.14 Stream Type

Stream Type: **B**

Bed Material: **Boulder**

Subclass Slope: **a**

Bed Form: **Step-Pool**

Field Measured Slope:

2.15 Reference Stream Type

(if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	**None**	**0.00**
Gullies	**None**	**0.00**

Step 3. Riparian Features

3.1 Stream Banks

Typical Bank Slope **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**
Lower		
Material Type	**Boulder/Cobbl**	**Boulder/Cobbl**
Consistency	**Non-cohesive**	**Non-cohesive**

Bank Erosion	Left	Right
Erosion Length (ft)	**0**	**0**
Erosion Height (ft)	**0.00**	**0.00**
Revetmt. Type	**Multiple**	**Multiple**
Revetmt. Length (ft)	**1,043**	**522**

Near Bank Veg. Type	Left	Right
Dominant	**Shrubs/Saplin**	**Shrubs/Saplin**
Sub-dominant	**Herbaceous**	**Deciduous**

Bank Canopy	Left	Right
Canopy %	**76-100**	**76-100**

Mid-Channel Canopy **Open**

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	**51-100**	**51-100**
Sub-dominant	**0-25**	**0-25**
W less than 25	**108**	**313**

Buffer Veg. Type	Left	Right
Dominant	**Mixed Trees**	**Deciduous**
Sub-dominant	**Deciduous**	**Herbaceous**

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	**Residential**	**Residential**
Sub-dominant	**Industrial**	**Forest**
Mass Failures	**0**	**0**
Height	**0**	**0**
Gullies	**0**	**0**
Height	**0**	**0**

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps **Minimal**

4.2 Adjacent Wetlands **None**

4.3 Flow Status **Moderate**

4.4 # of Debris Jams **0**

4.5 Flow Regulation Type **None**

Flow Regulation Use

Impoundments **Large**

Impoundmt. Location **Upstream**

4.6 Up/Down strm flow reg **None**

(old) Upstrm Flow Reg **Store-release**

4.7 StormwaterInputs

Field Ditch	**0**	Road Ditch	**3**
Other	**0**	Tile Drain	**0**
Overland Flow	**0**	Urb Strm Wtr Pipe	**2**

4.9 # of Beaver Dams **0**

Affected Length (ft) **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
2	**0**	**1**
Diagonal	**Delta**	**Island**
0	**0**	**2**

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
1	**0**	**0**	**0**

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
3	**0**	**No**

5.4 Stream Ford or Animal **No**

5.5 Straightening **Straightening**

Straightening Length: **1,233**

5.5 Dredging **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Phase 2 Segment Summary

Reach # T3.05 Segment: B Observers: Ruddell, McLane Segment Location: Starting approximately 1365 feet upstream of the Rte 10 bridge and continuing to the top of

April 7, 2009 SGAT Version: 4.56
Completion Date: October 23, 2008
Why Not assessed:
Rain: Yes

QC Status - Staff: Provisional Cons Passed

Step 1. Valley and Floodplain

1.1 Segmentation: **Planform and Scope**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments

Length (ft)	One	Both
Berms	0	0
height	0	0
Roads	265	0
height	0	0
Railroads	0	0
height	0	0
Improved Paths	0	0
height	0	0
Development	305	1,037

1.4 Adjacent Side	Left	Right
Hillside Slope	Steep	Very Steep
Continuous w/	Sometimes	Sometimes
W/in 1 Bankfill	Always	Always
Texture	Other	Other

1.5 Valley Features
Valley Width (ft): **110**
Width Determination: **Measured**
Confinement Type: **Semi-confined**
Rock Gorge?: **No**
Human-caused Change?: **Yes**

Step 2. Stream Channel

2.1 Bankfull Width: **52**
2.2 Max Depth (ft): **2.90**
2.3 Mean Depth (ft): **1.88**
2.4 Floodprone Width (ft): **110**

Notes:

Highly manipulated stream in area of flood control dam. Bed is mostly crushed rock and the upper segment is paved with boulders. Lower end has some "naturally" developed flood plain, upper end has some created floodplain.

Step 2. (Contued)

2.5 Aband. Floodpln: **2.90** ft.
Human Elev Floodpln: **0.00** ft.
2.6 Width/Depth Ratio: **27.45**
2.7 Entrenchment Ratio: **2.13**
2.8 Incision Ratio: **1.00**
Human Elevated Inc Rat: **0.00**
2.9 Sinuosity: **Low**
2.10 Riffles Type: **Sedimented**
2.11 Riffle/Step Spacing (ft): **135**
2.12 Substrate Composition

Bedrock	0%
Boulder	20%
Cobble	42%
Coarse Gravel	18%
Fine Gravel	1%
Sand	17%
Silt and smaller	2%

Silt/Clay Present?: **No**
Detritus: **1** %
Large Woody: **0**
2.13 Average Largest Particle on

Bed	15.0	inches
Bar	N/A	inches

2.14 Stream Type
Stream Type: **B**
Bed Material: **Cobble**
Subclass Slope: **None**
Bed Form: **Plane Bed**
Field Measured Slope:
2.15 Reference Stream Type (if different from Phase 1)

3.3 old	Amount	Mean Height
Failures	None	0.00
Gullies	None	0.00

Step 3. Riparian Features

3.1 Stream Banks
Typical Bank Slope: **Moderate**

Bank Texture	Left	Right
Upper		
Material Type	Sand	Sand
Consistency	Non-cohesive	Non-cohesive
Lower		
Material Type	Boulder/Cobbl	Boulder/Cobbl
Consistency	Non-cohesive	Non-cohesive
Bank Erosion	Left	Right
Erosion Length (ft)	0	0
Erosion Height (ft)	0.00	0.00
Revetmt. Type	Multiple	Multiple
Revetmt. Length (ft)	959	696
Near Bank Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Shrubs/Saplin
Sub-dominant	Herbaceous	Herbaceous
Bank Canopy	Left	Right
Canopy %	76-100	76-100
Mid-Channel Canopy		Open

3.2 Riparian Buffer

Buffer Width	Left	Right
Dominant	>100	0-25
Sub-dominant	0-25	26-50
W less than 25	668	1,690
Buffer Veg. Type	Left	Right
Dominant	Shrubs/Saplin	Herbaceous
Sub-dominant	Herbaceous	Shrubs/Saplin

3.3 Riparian Corridor

Corridor Land	Left	Right
Dominant	Shrubs/Saplin	Hay
Sub-dominant	Bare	Shrubs/Saplin
Mass Failures	0	0
Height	0	0
Gullies	0	0
Height	0	0

Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: **Minimal**
4.2 Adjacent Wetlands: **None**
4.3 Flow Status: **Moderate**
4.4 # of Debris Jams: **0**
4.5 Flow Regulation Type: **Large Store**
Flow Regulation Use: **Flood Control**
Impoundments: **Large**
Impoundmt. Location: **In Reach**
4.6 Up/Down strm flow reg: **None**
(old) Upstrm Flow Reg: **Store-release**
4.7 StormwaterInputs

Field Ditch	0	Road Ditch	0
Other	0	Tile Drain	0
Overland Flow	0	Urb Strm Wtr Pipe	0

4.9 # of Beaver Dams: **0**
Affected Length (ft): **0**

Step 5. Channel Bed and Planform Changes

5.1 Bar Types

Mid	Point	Side
0	0	0

Diagonal	Delta	Island
0	0	0

5.2 Other Features

Flood	Neck Cutoff	Avulsion	Braiding
0	0	0	0

5.3 Steep Riffles and Head Cuts

Steep Riffles	Head Cuts	Trib Rejuv.
0	0	No

5.4 Stream Ford or Animal: **No**
5.5 Straightening: **Straightening**
Straightening Length: **1,365**
5.5 Dredging: **None**

Note: Step 1.6 - Grade Controls and Step 4.8 - Channel Constrictions are on The second page of this report - with Steps 6 through 7.

Stream: **Stevens Branch** Reach # **M1.01** Segment: **A** Completion Date: **July 27, 2006**

Organization: **Winooski Conservation District** Observers: **Kelsey Rydland, Noelia Báez-** Rain: **Yes**

Segment Length (ft): **1,750** Segment Location: **M 1.01A is located between at the confluences with the Winooski and ~200ft upstream**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Other	60.0	Yes	Yes	Yes	No
Problem	Deposition Above,Scour Below				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**12**	**None**	**Yes**
7.2 Channel Aggradation	**12**	**None**	**No**
7.3 Widening Channel	**11**		**No**
7.4 Change in Planform	**10**		**No**
Total Score	**45**		
Geomorphic Rating	**0.5625**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	8
6.2 Embeddedness	13
6.3 Velocity/Depth Patterns	13
6.4 Sediment Deposition	12
6.5 Channel Flow Status	11
6.6 Channel Alteration	10
6.7 Frequency of Riffles/Steps	17
6.8 Bank Stability	Left: 4 Right: 3
6.9 Bank Vegetation Protection	Left: 7 Right: 8
6.10 Riparian Vegetation Zone Width	Left: 4 Right: 8
Total Score	118
Habitat Rating	0.59

Habitat Stream Condition **Fair**

Narrative:

Active overwidening process evidently by multiples bank erosions on both banks along the segment. Some planform adjustment and widening processactive near the confluences with the Winooski River.

Stream: **Stevens Branch** Reach # **M1.01** Segment: **B** Completion Date: **July 3, 2006**

Organization: **Winooski Conservation District** Observers: **Kelsey Rydland, Noelia Báez-** Rain: **Yes**

Segment Length (ft): **1,416** Segment Location: **M 1.01B is located ~200ft upstream from the mid-reach island (parallel to the end of**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Narrative:
Minor degradation

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**2**	**C to F**	**No**
7.2 Channel Aggradation	**13**	**Other**	**No**
7.3 Widening Channel	**8**		**No**
7.4 Change in Planform	**11**		**No**
Total Score	**34**		
Geomorphic Rating	**0.425**		

Channel Evolution Model **F**
Channel Evolution Stage **II**
Geomorphic Condition **Fair**
Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	5
6.2 Embeddedness	10
6.3 Velocity/Depth Patterns	7
6.4 Sediment Deposition	14
6.5 Channel Flow Status	15
6.6 Channel Alteration	4
6.7 Frequency of Riffles/Steps	3
6.8 Bank Stability	Left: 9 Right: 7
6.9 Bank Vegetation Protection	Left: 7 Right: 7
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 5
Total Score	95
Habitat Rating	0.475

Habitat Stream Condition **Fair**

Stream: **Stevens Branch** Reach # **M1.10** Segment: **A** Completion Date: **September 23,**

Organization: **Redstart Consulting** Observers: **TM, RM** Rain: **Yes**

Segment Length (ft): **1,837** Segment Location: **From just upstream of Bridge St bridge to just downstream of Rte 63 bridge.**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**No**
7.2 Channel Aggradation	**10**	**Other**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**14**		**No**
Total Score	**44**		
Geomorphic Rating	**0.55**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

Habitat Stream Condition **Fair**

Narrative:

Incision has led to widening and recent aggradation. Bankfull is tricky, many terraces and hard to decide which is true bankfull. Higher choice would make this more solidly an E stream. With this bankfull the stream is a C stream.

Stream: **Stevens Branch** Reach # **M1.10** Segment: **B** Completion Date: **September 11,**

Organization: **Redstart Consulting** Observers: **TM, AS** Rain: **Yes**

Segment Length (ft): **3,889** Segment Location: **just downstream of Route 63 bridge to upstream of VAST bridge where stream comes**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	43.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below				
Bridge	60.0	Yes	Yes	No	Yes
Problem	Deposition Below				
Bridge	39.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**13**	**None**	**Yes**
7.2 Channel Aggradation	**9**	**None**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**10**		**No**
Total Score	**41**		
Geomorphic Rating	**0.5125**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Incision has let to widening and aggradation. Incison ratio is not large and looks to be fairly recent.

Stream: **Stevens Branch** Reach # **M1.10** Segment: **C** Completion Date: **September 11,**

Organization: **Redstart Consulting** Observers: **McLane, Smith** Rain: **Yes**

Segment Length (ft): **963** Segment Location: **From upstream of VAST bridge and beginning of straightened section to end of**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**5**	**None**	**No**
7.2 Channel Aggradation	**9**	**None**	**No**
7.3 Widening Channel	**12**		**No**
7.4 Change in Planform	**9**		**Yes**

Total Score **35**

Geomorphic Rating **0.4375**

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Incision is primary process. Some widening and aggradation occurring. Planform changes are historic. The RB has been built up to 30 feet and developed.

Stream: **Stevens Branch** Reach # **M1.10** Segment: **D** Completion Date: **September 30,**

Organization: **Redstart Consulting** Observers: **McLane, Smith** Rain: **Yes**

Segment Length (ft): **575** Segment Location: **Top of straighted and developed section to just above tributary at base of M1-11 where**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**Yes**
7.2 Channel Aggradation	**9**	**Other**	**No**
7.3 Widening Channel	**10**		**No**
7.4 Change in Planform	**10**		**No**
Total Score	**40**		
Geomorphic Rating	**0.5**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Widening and aggradation have lead to stream class change E to C. Old terraces indicate historic incision and eroding banks indicate current widening. Large debris jam has caused some planform adjustment. Trib contributes significantly to sed load.

Stream: **Stevens Branch** Reach # **M1.11** Segment: **A** Completion Date: **September 30,**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane, Smith** Rain: **Yes**

Segment Length (ft): **3,048** Segment Location: **Starts just upstream of trib input from across Rte 14 about 900 feet north of Morris**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	24.0	Yes	Yes	Yes	No
Problem		Deposition Above,Deposition Below,Scour			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**13**	**None**	**Yes**
7.2 Channel Aggradation	**8**	**None**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**11**		**No**
Total Score	**41**		
Geomorphic Rating	**0.5125**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	15
6.2 Embeddedness	10
6.3 Velocity/Depth Patterns	13
6.4 Sediment Deposition	8
6.5 Channel Flow Status	10
6.6 Channel Alteration	12
6.7 Frequency of Riffles/Steps	12
6.8 Bank Stability	Left: 4 Right: 5
6.9 Bank Vegetation Protection	Left: 6 Right: 7
6.10 Riparian Vegetation Zone Width	Left: 10 Right: 6
Total Score	118
Habitat Rating	0.59

Habitat Stream Condition **Fair**

Narrative:

Historic incision has led to widening and aggradation as well as some planform adjustment. Widening has almost caused a stream type departure from an E to a C.

Stream: **Stevens Branch** Reach # **M1.11** Segment: **B** Completion Date: **September 20,**

Organization: **Redstart Consulting** Observers: **DR, TM** Rain: **Yes**

Segment Length (ft): **1,715** Segment Location: **Begins approximately 3030 upstream of beginning of reach (where trib comes in on**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	16.3	Yes	Yes	Yes	No
Problem	Deposition Below,Scour Above,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**8**	**None**	**No**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**12**		**No**
7.4 Change in Planform	**8**		**Yes**
Total Score	**38**		
Geomorphic Rating	**0.475**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	5
6.2 Embeddedness	13
6.3 Velocity/Depth Patterns	5
6.4 Sediment Deposition	12
6.5 Channel Flow Status	15
6.6 Channel Alteration	2
6.7 Frequency of Riffles/Steps	2
6.8 Bank Stability	Left: 4 Right: 3
6.9 Bank Vegetation Protection	Left: 4 Right: 5
6.10 Riparian Vegetation Zone Width	Left: 3 Right: 2
Total Score	75
Habitat Rating	0.375

Habitat Stream Condition **Fair**

Narrative:

Incision is likely to be dominant process as extensive riprap has arrested any widening. Aggradation not noticable and sediments likely move through this segment to be deposited in segment A.

Stream: **Stevens Branch** Reach # **M1.11** Segment: **C** Completion Date: **September 29,**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane** Rain: **Yes**

Segment Length (ft): **1,646** Segment Location: **Starts about 150 upstream of farm bridge and continues to just upstream of trib**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Old	21.0	Yes	No	Yes	No
Problem	Scour Above,Scour Below				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**13**	**None**	**Yes**
7.2 Channel Aggradation	**10**	**Other**	**No**
7.3 Widening Channel	**10**		**Yes**
7.4 Change in Planform	**14**		**No**
Total Score	**47**		
Geomorphic Rating	**0.5875**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	9
6.2 Embeddedness	12
6.3 Velocity/Depth Patterns	16
6.4 Sediment Deposition	10
6.5 Channel Flow Status	10
6.6 Channel Alteration	13
6.7 Frequency of Riffles/Steps	13
6.8 Bank Stability	Left: 6 Right: 7
6.9 Bank Vegetation Protection	Left: 7 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 5 Right: 5
Total Score	119
Habitat Rating	0.595

Habitat Stream Condition **Fair**

Narrative:

Historically incised and widened . Looks to be mostly stabilized. Some aggradation occuring and presumably will continue to adjust until it forms an E channel again. Almost doesn't make it over the terrace, which would make it close to a G stream.

Stream: **Stevens Branch** Reach # **M1.12** Segment: **A** Completion Date: **September 25,**

Organization: **Redstart Consulting** Observers: **McLane, Willard** Rain: **No**

Segment Length (ft): **1,910** Segment Location: **Begins just above Morin Rd/Kings Row trib confluence and continues to straightened**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	21.0	Yes	No	Yes	No
Problem	Deposition Below,Scour Above,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**12**	**None**	**Yes**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**8**		**Yes**
7.4 Change in Planform	**10**		**No**
Total Score	**40**		
Geomorphic Rating	**0.5**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Historic degredation and widening. Aggradation is leading to planform adjustment as the stream re-establishes itself in the channel. Widening has almost created a stream type departure E to C.

Stream: **Stevens Branch** Reach # **M1.12** Segment: **B** Completion Date: **September 25,**

Organization: **Redstart Consulting** Observers: **TM, AW** Rain: **No**

Segment Length (ft): **1,216** Segment Location: **From beginning of straightened and riprapped section 1895 ft upstream from**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**7**	**None**	**Yes**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**10**		**No**
7.4 Change in Planform	**8**		**Yes**
Total Score	**36**		
Geomorphic Rating	**0.45**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Incision appears to be historic and riprap (except at top of segment) is preventing overwidening. Aggradation more present in upper segment. but steep riffles forming in lower segment. Confusing reach with mixed features.

Stream: **Stevens Branch** Reach # **M1.13** Segment: **0** Completion Date: **September 30,**

Organization: **Redstart Consulting** Observers: **TM, AS** Rain: **Yes**

Segment Length (ft): **2,714** Segment Location: **0.14 miles south of the intersection of Farnham Rd and Rte 14, extending upstream to**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**Yes**
7.2 Channel Aggradation	**9**	**Other**	**No**
7.3 Widening Channel	**8**		**No**
7.4 Change in Planform	**9**		**No**
Total Score	**37**		
Geomorphic Rating	**0.4625**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	12
6.2 Embeddedness	11
6.3 Velocity/Depth Patterns	18
6.4 Sediment Deposition	7
6.5 Channel Flow Status	10
6.6 Channel Alteration	18
6.7 Frequency of Riffles/Steps	13
6.8 Bank Stability	Left: 5 Right: 6
6.9 Bank Vegetation Protection	Left: 7 Right: 7
6.10 Riparian Vegetation Zone Width	Left: 10 Right: 8
Total Score	132
Habitat Rating	0.66

Habitat Stream Condition **Good**

Narrative:

Primary processes are widening, aggradation, and planform changes. Incision and widening are historic, although widening appears to be ongoing. The stream is aggrading and rebuilding flood plane at a lower elevation.

Stream: **Stevens Branch** Reach # **M1.14** Segment: **0** Completion Date: **September 24,**

Organization: **Redstart Consulting** Observers: **TM, AS** Rain: **No**

Segment Length (ft): **1,812** Segment Location: **From upstream of tributary confluence approximately 0.3 miles downstream from**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	21.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**No**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**13**		**No**
7.4 Change in Planform	**11**		**Yes**

Total Score **45**

Geomorphic Rating **0.5625**

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Incision is primary process. Widening and aggradation are localized. Aggradation probably due to upstream erosion rather than in-reach widening. Planform changes are mostly historic in the form of straightening and maintaining.

Stream: **Stevens Branch** Reach # **M1.15** Segment: **A** Completion Date: **September 24,**

Organization: **Redstart Consulting** Observers: **McLane, Smith** Rain: **No**

Segment Length (ft): **3,611** Segment Location: **Upstream of Rte14 bridge near Falls Bridge Road to downstream of bridge on**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**12**	**None**	**No**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**10**		**No**
7.4 Change in Planform	**7**		**No**

Total Score **40**

Geomorphic Rating **0.5**

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Incision might be historic (recently so) and widening is currently the dominant process due to lack of bank stabilization not just incision. Aggradation and planform changes are also occuring.

Stream: **Stevens Branch** Reach # **M1.15** Segment: **B** Completion Date: **September 26,**

Organization: **Redstart Consulting** Observers: **McLane, McCall** Rain: **No**

Segment Length (ft): **853** Segment Location: **From downstream of Brockway Hill Road bridge to tributary confluence downstream of**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	32.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**Yes**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**10**		**No**
7.4 Change in Planform	**7**		**Yes**

Total Score **37**

Geomorphic Rating **0.4625**

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Channel adjustment arrested in parts due to extensive riprap. Incision appears historic. Aggredation is occurring and widening too, where it can. Planform change is partially historic (straightening and probably dredging). Some current as well.

Stream: **Stevens Branch** Reach # **M1.16** Segment: **A** Completion Date: **September 23,**

Organization: **Redstart Consulting** Observers: **TM, DR, GA, SP, RM etc** Rain: **Yes**

Segment Length (ft): **794** Segment Location: **From upstream of trib confluence on Brockway road (by Zamperi Dr) to bottom of**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	2.00	2.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	15.0	Yes	Yes	Yes	Yes
Problem	Deposition Below,Scour Above				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**18**	**None**	**Yes**
7.2 Channel Aggradation	**17**	**None**	**No**
7.3 Widening Channel	**17**		**No**
7.4 Change in Planform	**17**		**Yes**

Total Score	**69**
Geomorphic Rating	**0.8625**
Channel Evolution Model	**F**
Channel Evolution Stage	**I**
Geomorphic Condition	**Referenc**
Stream Sensitivity	**Very Low**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

No significantly active processes happening. Bedrock acts as a stabilizer. Past human disturbance in the form of mills. Current disturbance in encroachment and narrow bridge. Some A valley with steeper slope, some definate B valley.

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Waterfall	Mid-segment	48.00	45.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Narrative:

Step 7. Rapid Geomorphic Assessment Data

Confinement Type

Channel Evolution Model
Channel Evolution Stage
Geomorphic Condition **Referenc**
Stream Sensitivity

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	18.0	Yes	Yes	Yes	Yes

Problem: Scour Below

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**No**
7.2 Channel Aggradation	**12**	**None**	**No**
7.3 Widening Channel	**13**		**No**
7.4 Change in Planform	**12**		**Yes**
Total Score	**48**		
Geomorphic Rating	**0.6**		

Channel Evolution Model **F**
Channel Evolution Stage **II**
Geomorphic Condition **Fair**
Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:
Incision is the dominant process here with some aggradation occuring as well. Historic planform changes in the form of straightening.

Stream: **Jail Branch** | Reach # **T3.01** | Segment: **A** | Completion Date: **October 13, 2008**

Organization: **Redstart Consulting** | Observers: **DR, AS, TM** | Rain: **Yes**

Segment Length (ft): **902** | Segment Location: **From confluence of Jail Branch and Stevens Branch to just upstream of bridge on Ayers**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPS Taken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Old	33.0	Yes	Yes	Yes	No
Problem		Deposition Above,Deposition Below,Scour			
Bridge	80.0	Yes	Yes	No	Yes
Problem		Deposition Above,Deposition Below,Scour			
Bridge	63.3	Yes	Yes	Yes	Yes
Problem		None			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**4**	**C to F**	**No**
7.2 Channel Aggradation	**8**	**None**	**No**
7.3 Widening Channel	**8**		**No**
7.4 Change in Planform	**8**		**Yes**
Total Score	**28**		
Geomorphic Rating	**0.35**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	7
6.2 Embeddedness	8
6.3 Velocity/Depth Patterns	6
6.4 Sediment Deposition	17
6.5 Channel Flow Status	15
6.6 Channel Alteration	2
6.7 Frequency of Riffles/Steps	6
6.8 Bank Stability	Left: 8 Right: 7
6.9 Bank Vegetation Protection	Left: 3 Right: 3
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 2
Total Score	86
Habitat Rating	0.43

Habitat Stream Condition **Fair**

Narrative:

It is a little hard to read the processes occurring here. Degredation has occurred and might still be occurring. Planform human and historic. Aggradation occurring in next segment and upstream of bridges in this seg. Widening arrested by riprap

Stream: **Jail Branch** Reach # **T3.01** Segment: **B** Completion Date: **October 4, 2008**

Organization: **Redstart Consulting** Observers: **DR, AS** Rain: **Yes**

Segment Length (ft): **2,572** Segment Location: **From approximately 265 feet upstream of the Main Street bridge, to the top of the**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	4.00	3.00	Yes	
Ledge	Mid-segment	5.00	2.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	60.2	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**9**	**None**	**Yes**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**11**		**No**
7.4 Change in Planform	**11**		**Yes**
Total Score	**42**		
Geomorphic Rating	**0.525**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	5
6.2 Embeddedness	9
6.3 Velocity/Depth Patterns	7
6.4 Sediment Deposition	8
6.5 Channel Flow Status	14
6.6 Channel Alteration	5
6.7 Frequency of Riffles/Steps	5
6.8 Bank Stability	Left: 6 Right: 6
6.9 Bank Vegetation Protection	Left: 6 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 2
Total Score	81
Habitat Rating	0.405

Habitat Stream Condition **Fair**

Narrative:

Arrested evolution due to extensive riprapping that limits planform change and widening. Floodplain access still available on one side. Features are not setting up well.

Stream: **Jail Branch** Reach # **T3.02** Segment: **A** Completion Date: **October 15, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Ruddell** Rain: **Yes**

Segment Length (ft): **1,177** Segment Location: **Beginning approximately 600 feet upstream of the Ayers Street bridge to just**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	8.00	5.00	Yes	
Ledge	Mid-segment	19.00	17.00	Yes	
Waterfall	Mid-segment	50.00	44.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bedrock	20.0	Yes	Yes	Yes	Yes
Problem	Scour Above,Scour Below				
Old	39.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Scour Above,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**13**	**B to F**	**Yes**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**10**		**Yes**
7.4 Change in Planform	**11**		**No**

Total Score **45**

Geomorphic Rating **0.5625**

Channel Evolution Model **D**

Channel Evolution Stage **IIc**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	14
6.2 Embeddedness	14
6.3 Velocity/Depth Patterns	18
6.4 Sediment Deposition	13
6.5 Channel Flow Status	15
6.6 Channel Alteration	20
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 8 Right: 5
6.9 Bank Vegetation Protection	Left: 8 Right: 8
6.10 Riparian Vegetation Zone Width	Left: 6 Right: 6
Total Score	153
Habitat Rating	0.765

Habitat Stream Condition **Good**

Narrative:

Used D model because of bedrock base. The stream appears to be a B to F, overwidened and somewhat aggraded. Bedrock has arrested incision and planform change. Major issue here has to do with steep unstable slopes mass-failing.

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	1.00	0.00	Yes	

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**5**	**None**	**Yes**
7.2 Channel Aggradation	**8**	**None**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**8**		**No**
Total Score	**30**		
Geomorphic Rating	**0.375**		

Channel Evolution Model	**F**
Channel Evolution Stage	**IV**
Geomorphic Condition	**Fair**
Stream Sensitivity	**High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	12
6.2 Embeddedness	10
6.3 Velocity/Depth Patterns	11
6.4 Sediment Deposition	6
6.5 Channel Flow Status	8
6.6 Channel Alteration	7
6.7 Frequency of Riffles/Steps	12
6.8 Bank Stability	Left: 6 Right: 6
6.9 Bank Vegetation Protection	Left: 7 Right: 5
6.10 Riparian Vegetation Zone Width	Left: 9 Right: 3
Total Score	102
Habitat Rating	0.51

Habitat Stream Condition **Fair**

Narrative:
Historically incised and widened and has created new small flood terraces. Some signs of aggredation and planform adjustments.

Stream: **Honey Brook** Reach # **T3.02S4.01** Segment: **A** Completion Date: **September 8,**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Rain: **Yes**

Segment Length (ft): **1,949** Segment Location: **Beginning at the confluence of Honey Brook and the Jail Branch, approximately 1065**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	13.6	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**9**	**None**	**No**
7.2 Channel Aggradation	**8**	**None**	**No**
7.3 Widening Channel	**6**		**No**
7.4 Change in Planform	**5**		**No**
Total Score	**28**		
Geomorphic Rating	**0.35**		

Channel Evolution Model **F**

Channel Evolution Stage **III**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Planform changes after two flood events and extensive mass failing.

Stream: **Honey Brook** Reach # **T3.02S4.01** Segment: **B** Completion Date: **September 8,**

Organization: **Redstart Consulting** Observers: **Ruddell, Andrews, Currier** Rain: **Yes**

Segment Length (ft): **1,285** Segment Location: **Rte. 302 confluence with Jail Branch to trib confluence DS of E/W Cobble Hill Rd.**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Ledge	Mid-segment	22.00	22.00	Yes	
Ledge	Mid-segment	26.00	23.00	Yes	
Ledge	Mid-segment	3.00	3.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bedrock	13.0	Yes	Yes	Yes	Yes
Problem	Scour Below				
Old	19.5	Yes	Yes	Yes	No
Problem	Deposition Above,Deposition Below				
Culvert	4.00	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition Below,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**No**
7.2 Channel Aggradation	**9**	**None**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**9**		**No**
Total Score	**37**		
Geomorphic Rating	**0.4625**		

Channel Evolution Model **D**

Channel Evolution Stage **IIc**

Geomorphic Condition **Fair**

Stream Sensitivity **Extreme**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

aggradation and planform change following high flows; channel avulsions likely but limited in extent by intermittent resistant boundary materials; bed erodible in some areas, but limited incision due to intermittent bedrock/boulder substrate

Stream: **Honey Brook** Reach # **T3.02S4.02** Segment: **A** Completion Date: **September 22,**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Rain: **No**

Segment Length (ft): **651** Segment Location: **Beginning just upstream of Cobble Hill Road crossing, and continuing 690 feet**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	4.00	Yes	Yes	Yes	Yes
Problem	Deposition Below,Scour Above,Scour				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**5**	**C to B**	**Yes**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**8**		**No**
7.4 Change in Planform	**6**		**No**
Total Score	**29**		
Geomorphic Rating	**0.3625**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Limited planform processes following deep historic incision, somewhat stabilized. Undersized culverts, urban sw inputs, and loss of US wetland attenuation are affecting segment.

Stream: **Honey Brook** Reach # **T3.02S4.02** Segment: **B** Completion Date: **September 23,**

Organization: **Redstart Consulting** Observers: **Ruddell, Currier, Andrews** Rain: **No**

Segment Length (ft): **6,289** Segment Location: **Beginning approximately 700 feet upstream of E/W Cobble Hill Road intersection and**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Culvert	4.00	Yes	Yes	Yes	Yes
Problem	Scour Below				
Old	21.0	Yes	Yes	Yes	No
Problem	Deposition Below,Scour Below				
Culvert	1.40	Yes	Yes	Yes	Yes
Problem	Scour Below				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**Yes**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**11**		**No**
7.4 Change in Planform	**12**		**No**
Total Score	**43**		
Geomorphic Rating	**0.5375**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **Very High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type

Habitat Stream Condition

Narrative:

Minor widening and planform change through aggradation following historic incision; portions likely ditched historically for agricultural use, also channelized at road crossings; historic beaver impoundments also possible but not currently evident

Stream: **Jail Branch** | Reach # **T3.03** | Segment: **A** | Completion Date: **October 15, 2008**

Organization: **Redstart Consulting** | Observers: **McLane, Ruddell** | Rain: **Yes**

Segment Length (ft): **4,743** | Segment Location: **From upstream of private bridge west of Messier Road to approximately 3220 feet**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	75.0	Yes	Yes	Yes	Yes

Problem: Deposition Above,Deposition Below

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**Yes**
7.2 Channel Aggradation	**11**	**None**	**No**
7.3 Widening Channel	**10**		**No**
7.4 Change in Planform	**10**		**No**
Total Score	**41**		
Geomorphic Rating	**0.5125**		

Channel Evolution Model **F**

Channel Evolution Stage **IV**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	16
6.2 Embeddedness	15
6.3 Velocity/Depth Patterns	17
6.4 Sediment Deposition	13
6.5 Channel Flow Status	9
6.6 Channel Alteration	8
6.7 Frequency of Riffles/Steps	13
6.8 Bank Stability	Left: 6 Right: 8
6.9 Bank Vegetation Protection	Left: 5 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 7
Total Score	125
Habitat Rating	0.625

Habitat Stream Condition **Fair**

Narrative:

Historic incision has led to widening and rebuilding of floodplain. Aggradation is occuring probably due to upstream sediment inputs. Some recent incision/widening evident on meander curves. Confinement has changed due to road/fldplain being built up

Stream: **Jail Branch** Reach # **T3.03** Segment: **B** Completion Date: **October 15, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Ruddell** Rain: **Yes**

Segment Length (ft): **764** Segment Location: **From upstream of Rte 302 bridge near McGlaughlin road where mass failures start on**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**10**	**None**	**No**
7.2 Channel Aggradation	**14**	**None**	**No**
7.3 Widening Channel	**13**		**No**
7.4 Change in Planform	**10**		**Yes**
Total Score	**47**		
Geomorphic Rating	**0.5875**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	18
6.2 Embeddedness	15
6.3 Velocity/Depth Patterns	17
6.4 Sediment Deposition	18
6.5 Channel Flow Status	15
6.6 Channel Alteration	12
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 8 Right: 6
6.9 Bank Vegetation Protection	Left: 7 Right: 10
6.10 Riparian Vegetation Zone Width	Left: 3 Right: 10
Total Score	157
Habitat Rating	0.785

Habitat Stream Condition **Good**

Narrative:

Incision and planform adjustments are primary processes here. The segment is short, majorly riprapped all along LB and boulders help to disburse some stream energy, so much of the effect of the low rating is manifesting downstream. Some recent RipRp

Stream: **Jail Branch** Reach # **T3.04** Segment: **A** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Rain: **Yes**

Segment Length (ft): **1,828** Segment Location: **Upstream of trib confluence that enters just downstream of Quarry Hill Mini Storage to**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPS Taken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**12**	**None**	**No**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**9**		**No**
7.4 Change in Planform	**9**		**No**
Total Score	**40**		
Geomorphic Rating	**0.5**		

Channel Evolution Model **D**

Channel Evolution Stage **IIc**

Geomorphic Condition **Fair**

Stream Sensitivity **Very Low**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	18
6.2 Embeddedness	13
6.3 Velocity/Depth Patterns	18
6.4 Sediment Deposition	15
6.5 Channel Flow Status	16
6.6 Channel Alteration	13
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 7 Right: 3
6.9 Bank Vegetation Protection	Left: 8 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 7 Right: 8
Total Score	150
Habitat Rating	0.75

Habitat Stream Condition **Good**

Narrative:

Resistant bed inhibits much incision here. Other processes are all active. Upstream development, MFs and erosion leading to greater flows and greater sediment loads causing aggredtion, widening and planform adjustments.

Stream: **Jail Branch** Reach # **T3.04** Segment: **B** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Rain: **Yes**

Segment Length (ft): **1,111** Segment Location: **From a point on the stream roughly due west of Pelletiers Car Wash where the stream**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Other	21.0	Yes	Yes	Yes	No
Problem	Scour Above,Scour Below				
Bridge	42.0	Yes	Yes	Yes	Yes
Problem	Deposition Above,Deposition				

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**No**
7.2 Channel Aggradation	**10**	**None**	**No**
7.3 Widening Channel	**7**		**No**
7.4 Change in Planform	**3**		**No**

Total Score **31**

Geomorphic Rating **0.3875**

Channel Evolution Model **D**

Channel Evolution Stage **IIc**

Geomorphic Condition **Fair**

Stream Sensitivity **Very Low**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	18
6.2 Embeddedness	17
6.3 Velocity/Depth Patterns	18
6.4 Sediment Deposition	16
6.5 Channel Flow Status	11
6.6 Channel Alteration	9
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 7 Right: 1
6.9 Bank Vegetation Protection	Left: 4 Right: 5
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 8
Total Score	134
Habitat Rating	0.67

Habitat Stream Condition **Good**

Narrative:

Stream has become entrenched due to filling in the floodplain. Aggradation due to MF& unstable slopes on RB, and bridge constriction. Localized widening. Encroachment and riprap on LB has prevented recent planform adjustments.

Stream: **Jail Branch** | Reach # **T3.04** | Segment: **C** | Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** | Observers: **McLane, Goodwin** | Rain: **Yes**

Segment Length (ft): **1,341** | Segment Location: **From above bridge on Rte 302 (at intersection of old and new Rte 302) to**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPS Taken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

	Score	STD	Historic
7.1 Channel Degradation	**11**	**None**	**No**
7.2 Channel Aggradation	**16**	**None**	**No**
7.3 Widening Channel	**12**		**No**
7.4 Change in Planform	**13**		**Yes**
Total Score	**52**		
Geomorphic Rating	**0.65**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Good**

Stream Sensitivity **Very Low**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	14
6.2 Embeddedness	16
6.3 Velocity/Depth Patterns	9
6.4 Sediment Deposition	18
6.5 Channel Flow Status	13
6.6 Channel Alteration	18
6.7 Frequency of Riffles/Steps	16
6.8 Bank Stability	Left: 9 Right: 8
6.9 Bank Vegetation Protection	Left: 6 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 5 Right: 5
Total Score	143
Habitat Rating	0.715

Habitat Stream Condition **Good**

Narrative:

Substrate is resistant and incision and widening probably take place slowly. Aggradation is minimal, planform changes mostly historic. This segment has room to flood and there is opportunity for planform change.

Stream: **Jail Branch** Reach # **T3.04** Segment: **D** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **McLane, Goodwin** Rain: **Yes**

Segment Length (ft): **819** Segment Location: **From approximately 1350 feet upstream of bridge on 302 (at intersection of old and**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**5**	**B to F**	**No**
7.2 Channel Aggradation	**15**	**None**	**No**
7.3 Widening Channel	**8**		**No**
7.4 Change in Planform	**7**		**Yes**
Total Score	**35**		
Geomorphic Rating	**0.4375**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	16
6.2 Embeddedness	12
6.3 Velocity/Depth Patterns	13
6.4 Sediment Deposition	15
6.5 Channel Flow Status	16
6.6 Channel Alteration	6
6.7 Frequency of Riffles/Steps	18
6.8 Bank Stability	Left: 8 Right: 8
6.9 Bank Vegetation Protection	Left: 7 Right: 8
6.10 Riparian Vegetation Zone Width	Left: 2 Right: 3
Total Score	132
Habitat Rating	0.66

Habitat Stream Condition **Good**

Narrative:

Processes arrested due to extensive and ongoing riprapping of edges. Large substrate size stabilizes bed. The valley has been artificially narrowed almost changing stream type. Aggradation is minimal, widening is localized, planform change historic.

Stream: **Jail Branch** Reach # **T3.05** Segment: **A** Completion Date: **October 17, 2008**

Organization: **Redstart Consulting** Observers: **Ruddell, McLane** Rain: **Yes**

Segment Length (ft): **1,515** Segment Location: **From abandonned mill just downstream of the Route 10 bridge to approximately 1365**

1.6 Grade Controls

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken
Dam	Mid-segment	8.00	6.00	Yes	

4.8 Channel Constrictions

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?
Bridge	40.0	Yes	Yes	Yes	Yes
	Problem	Deposition Above,Scour Above,Alignment			
Old	8.80	Yes	Yes	Yes	Yes
	Problem	Deposition Above,Scour Below			

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**8**	**None**	**Yes**
7.2 Channel Aggradation	**12**	**None**	**No**
7.3 Widening Channel	**11**		**Yes**
7.4 Change in Planform	**10**		**Yes**
Total Score	**41**		
Geomorphic Rating	**0.5125**		

Channel Evolution Model **F**

Channel Evolution Stage **II**

Geomorphic Condition **Fair**

Stream Sensitivity **Very Low**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

	Score
6.1 Epifaunal Substrate - Available Cover	16
6.2 Embeddedness	12
6.3 Velocity/Depth Patterns	9
6.4 Sediment Deposition	14
6.5 Channel Flow Status	16
6.6 Channel Alteration	6
6.7 Frequency of Riffles/Steps	10
6.8 Bank Stability	Left: 5 Right: 8
6.9 Bank Vegetation Protection	Left: 7 Right: 6
6.10 Riparian Vegetation Zone Width	Left: 4 Right: 5
Total Score	118
Habitat Rating	0.59

Habitat Stream Condition **Fair**

Narrative:

Actually II-III evolution stage. Historically incision leading to widening and planform changes that are limited by extensive riprap and coarse substrate.

Stream: **Jail Branch** | Reach # **T3.05** | Segment: **B** | Completion Date: **October 23, 2008**

Organization: **Redstart Consulting** | Observers: **Ruddell, McLane** | Rain: **Yes**

Segment Length (ft): **1,365** | Segment Location: **Starting approximately 1365 feet upstream of the Rte 10 bridge and continuing to the**

1.6 Grade Controls **None**

Type	Location	Total	Total Height Above Water	Photo Taken	GPSTaken

4.8 Channel Constrictions **None**

Type	Width	Photo Taken?	GPS Taken?	Channel Constriction?	Floodprone Constriction?

Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Confined**

	Score	STD	Historic
7.1 Channel Degradation	**9**	**None**	**Yes**
7.2 Channel Aggradation	**12**	**None**	**No**
7.3 Widening Channel	**13**		**No**
7.4 Change in Planform	**12**		**Yes**
Total Score	**46**		
Geomorphic Rating	**0.575**		

Channel Evolution Model **F**

Channel Evolution Stage **I**

Geomorphic Condition **Fair**

Stream Sensitivity **High**

Step 6. Rapid Habitat Assessment Data

Stream Gradient Type **High**

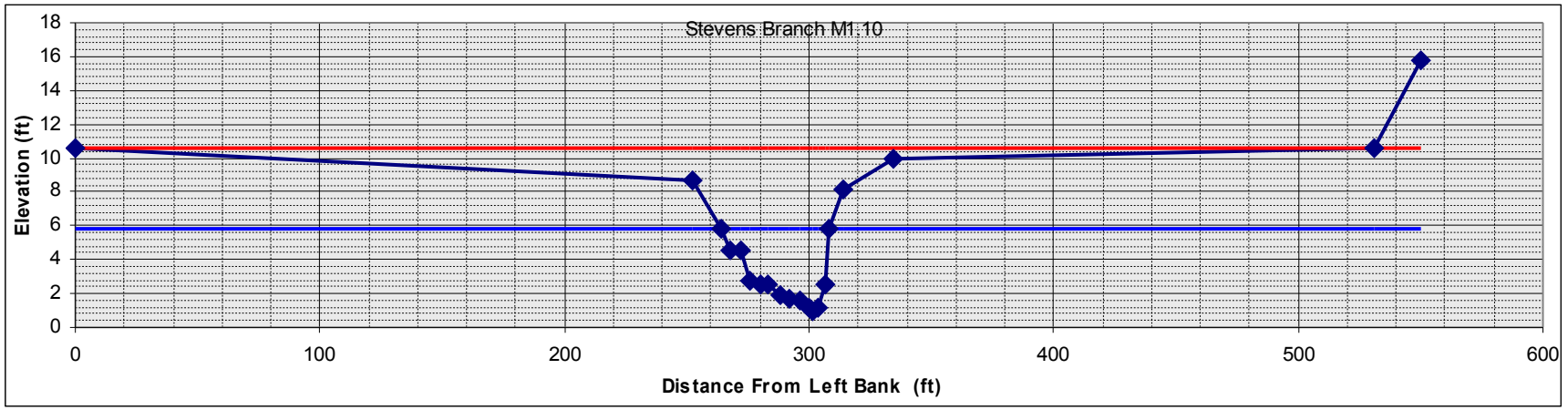
	Score
6.1 Epifaunal Substrate - Available Cover	5
6.2 Embeddedness	14
6.3 Velocity/Depth Patterns	6
6.4 Sediment Deposition	13
6.5 Channel Flow Status	18
6.6 Channel Alteration	1
6.7 Frequency of Riffles/Steps	5
6.8 Bank Stability	Left: 9 Right: 9
6.9 Bank Vegetation Protection	Left: 5 Right: 5
6.10 Riparian Vegetation Zone Width	Left: 4 Right: 2
Total Score	96
Habitat Rating	0.48

Habitat Stream Condition **Fair**

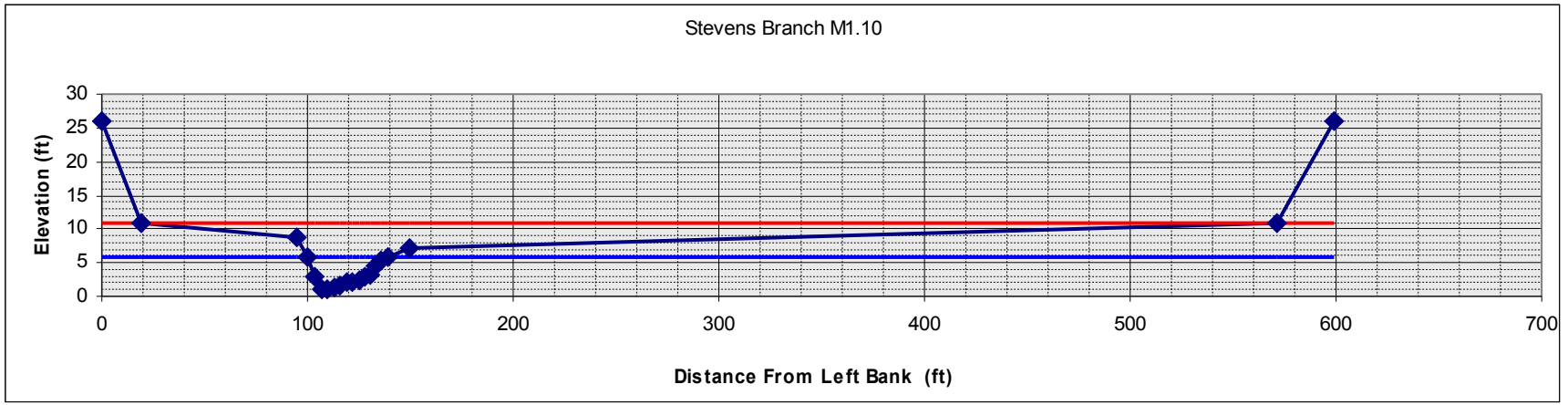
Narrative:

Relatively stable due to enormous amoung of riprap, bed paving, and created floodplain (as well as some "natural floodplain"). Channel extensively manipulated, valley possibly widened.

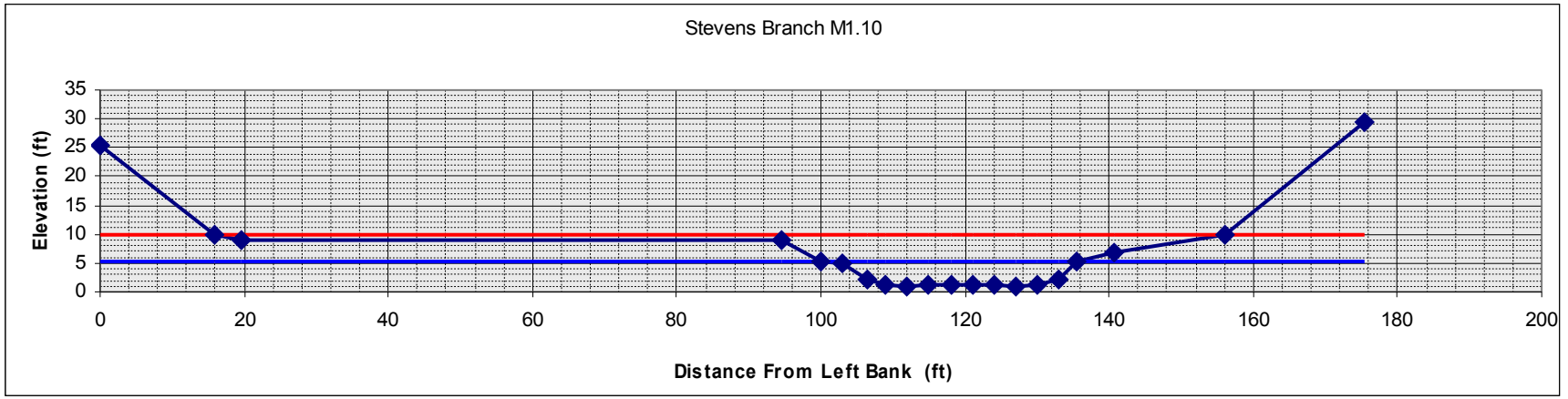
APPENDIX E: CROSS-SECTIONS
STEVENS BRANCH



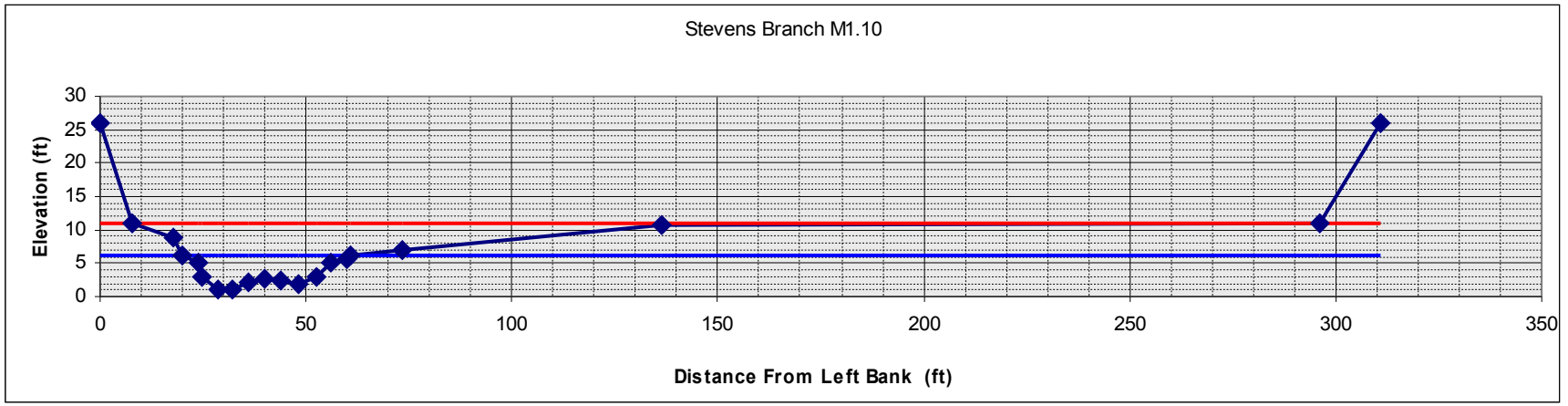
Cross-section for reach M1.10, segment A.



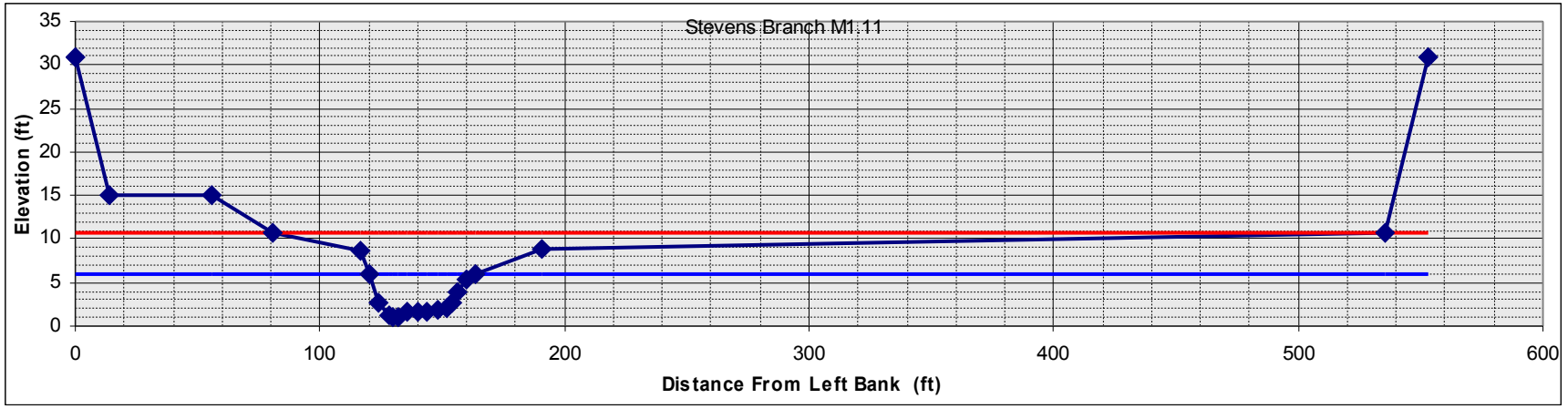
Cross-section for reach M1.10, segment B.



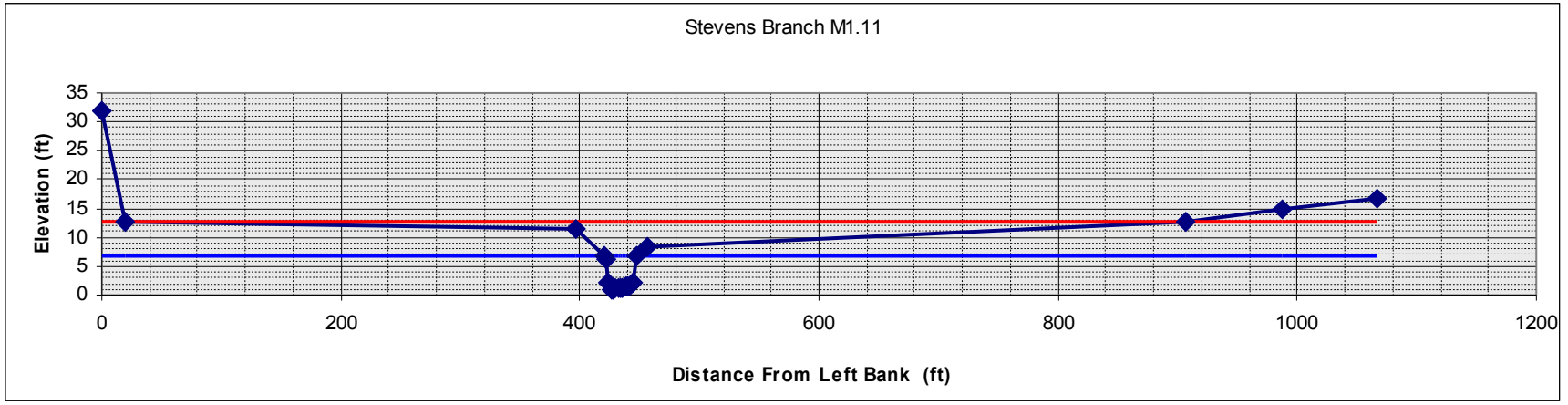
Cross-section for M1.10, segment C



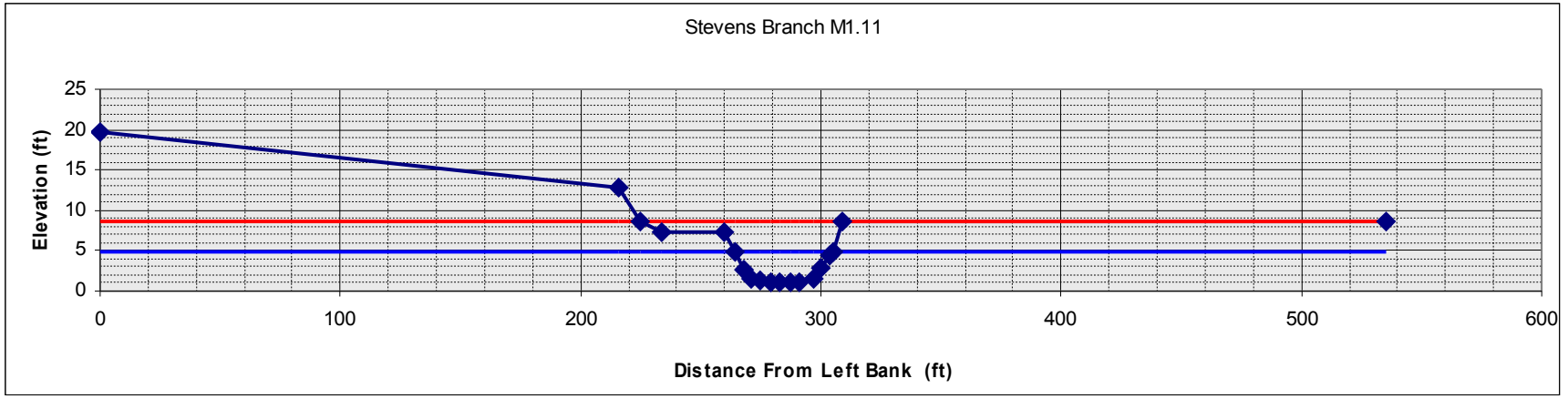
Cross-section for M1.10, segment D



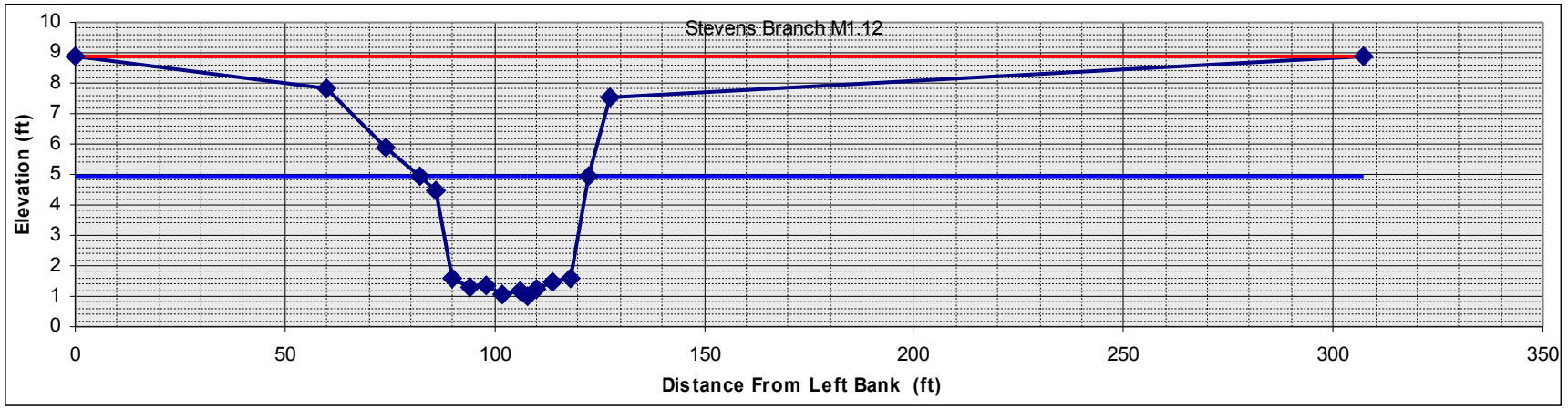
Cross-section for M1.11, segment A



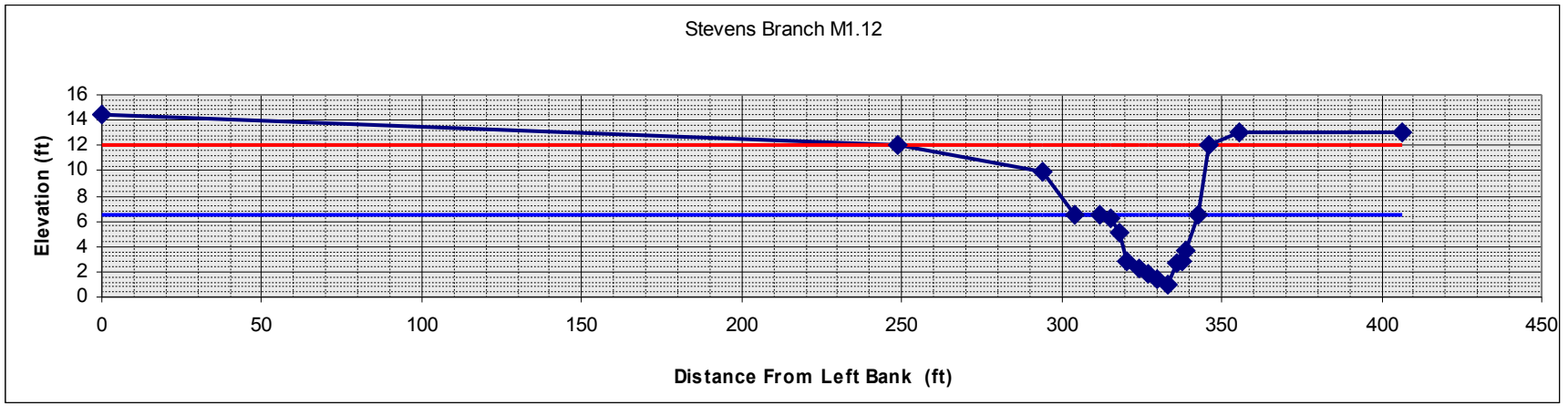
Cross-section for M1.11, segment B



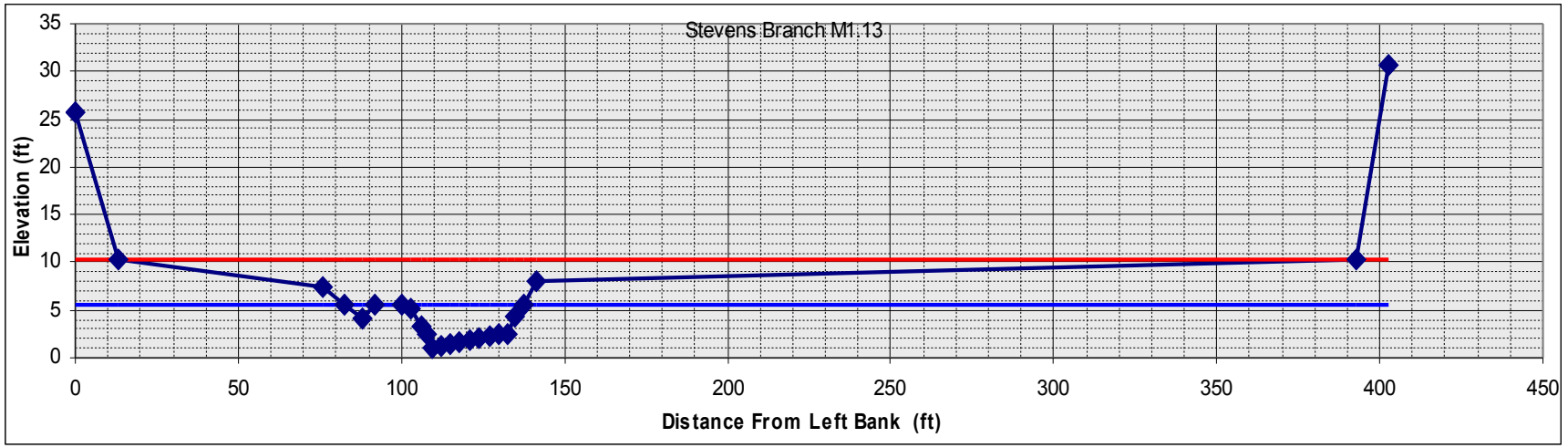
Cross-section for M1.11, segment C



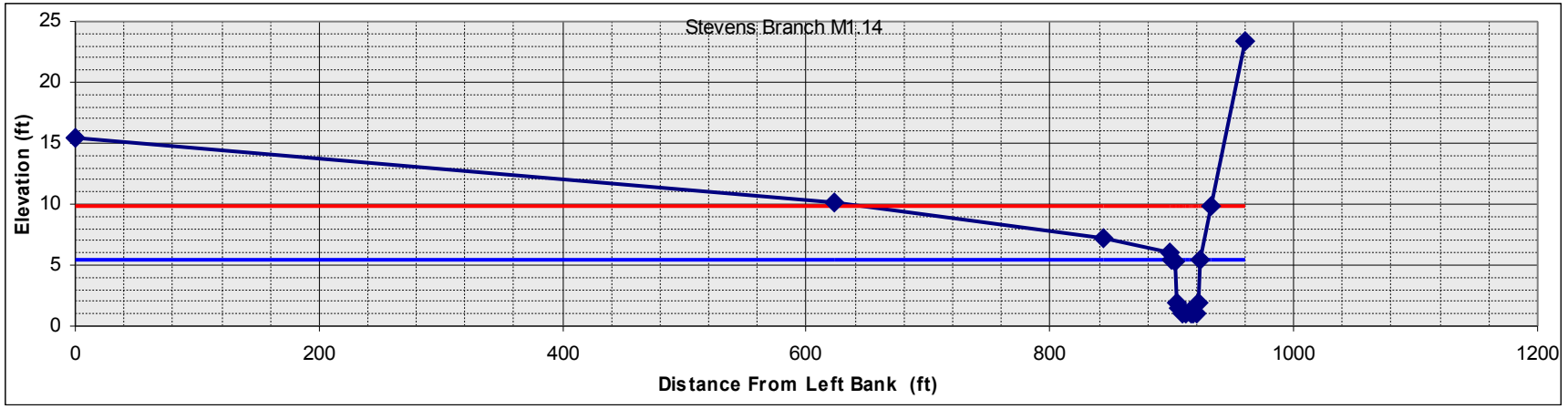
Cross-section for M1.12, segment A



Cross-section for M1.12, segment B

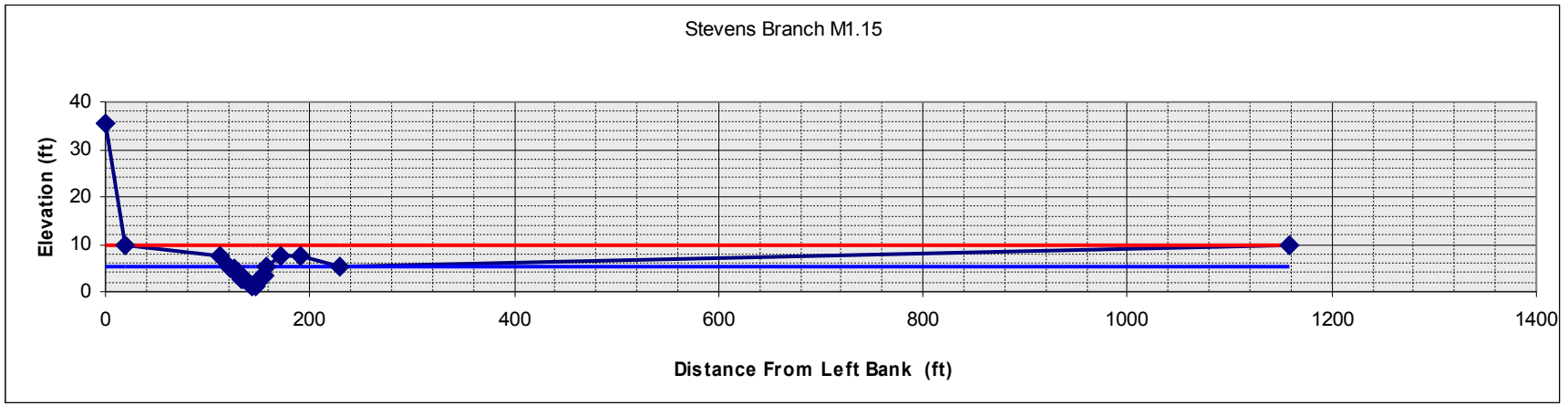


Cross-section for M1.13, segment A

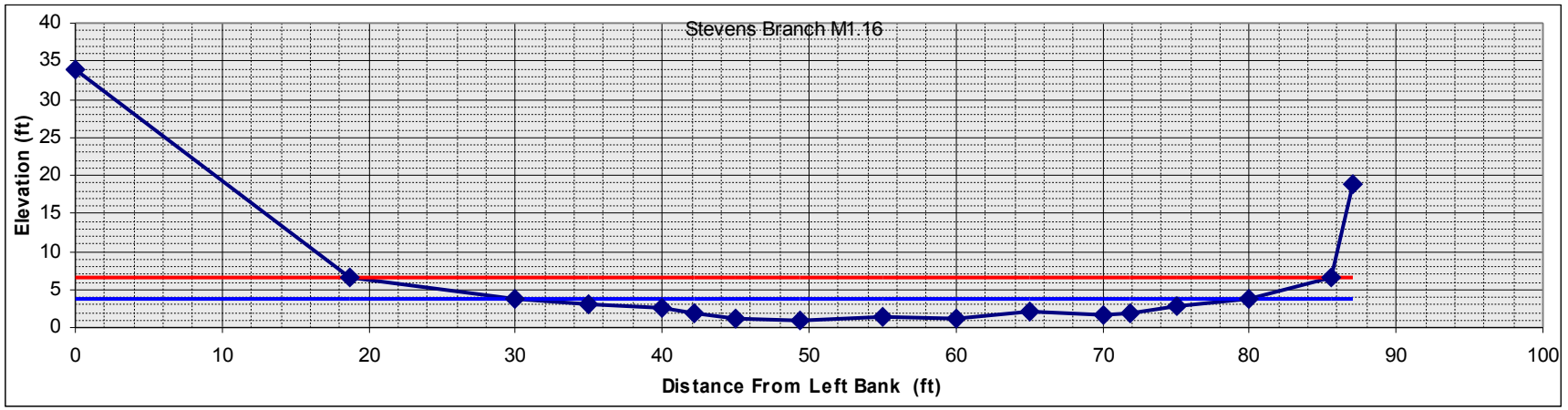


Cross-section for M1.14, segment B

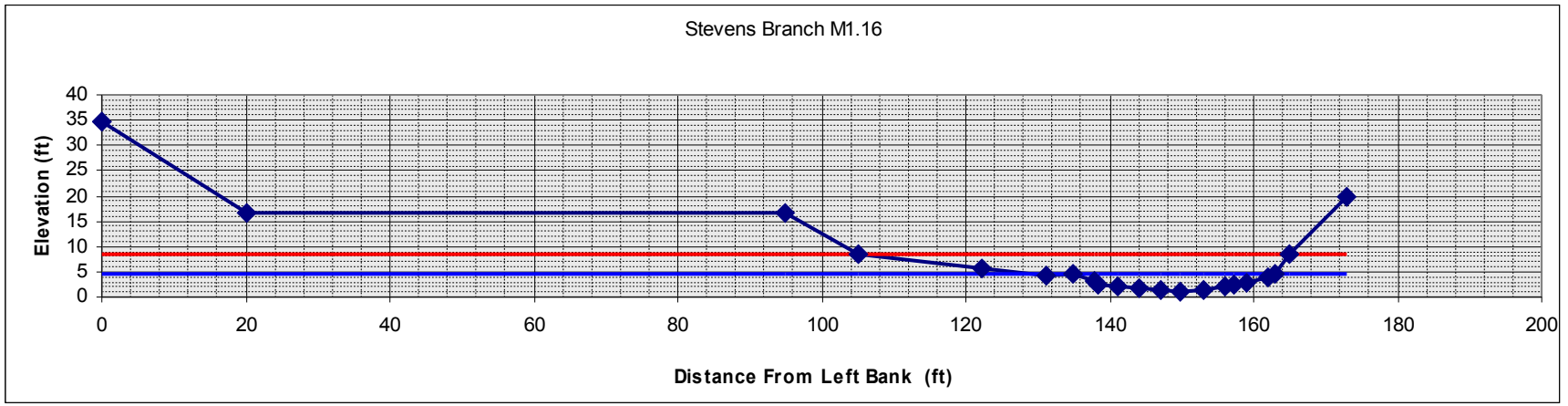
Cross-section for M1.15, segment A



Cross-section for M1.15, segment B

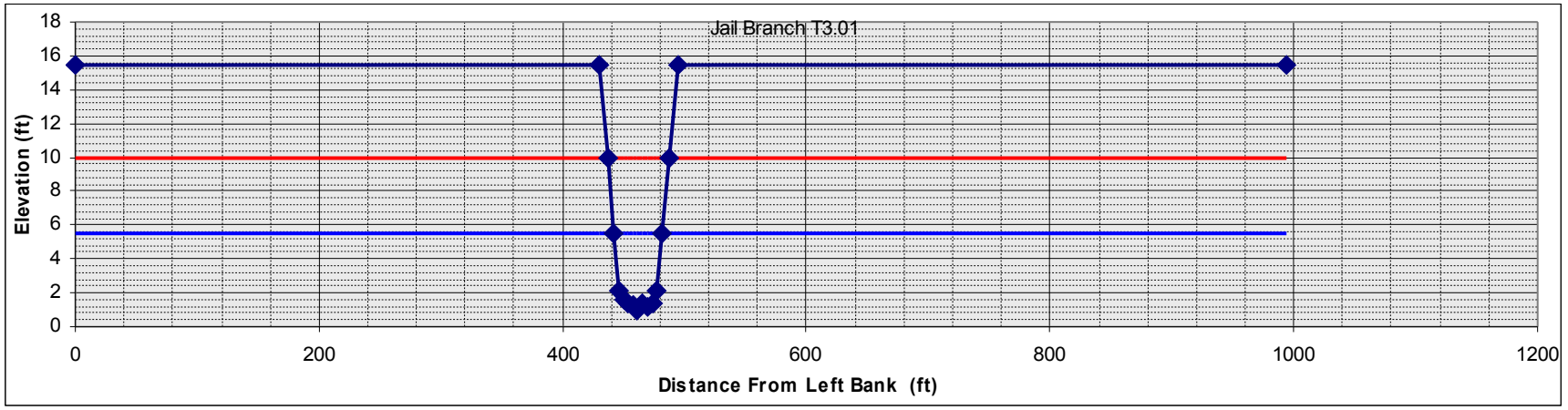


Cross-section for M1.16, segment A

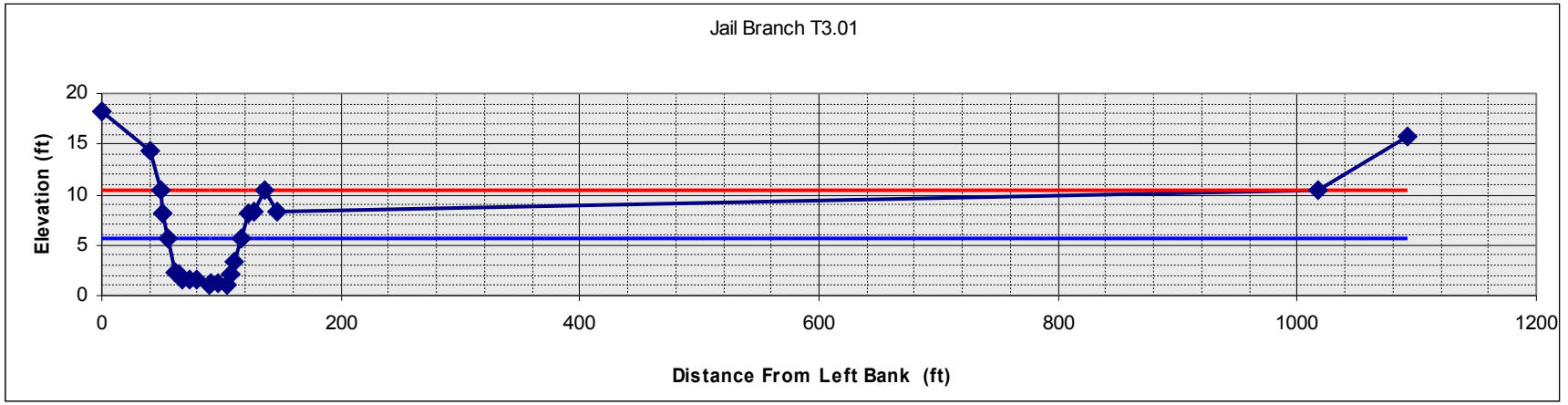


Cross-section for M1.16, segment B

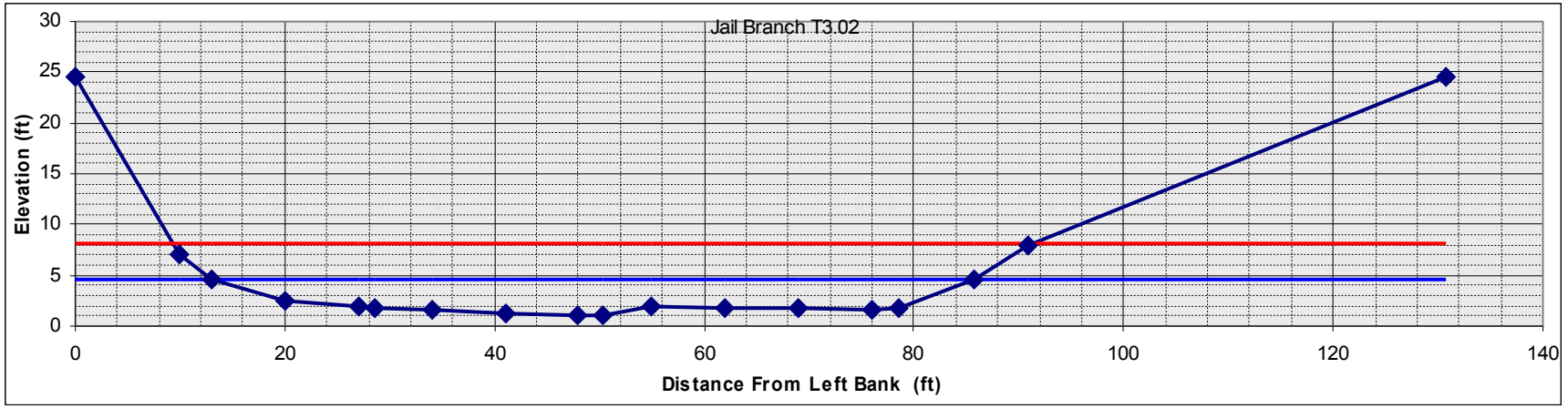
JAIL BRANCH



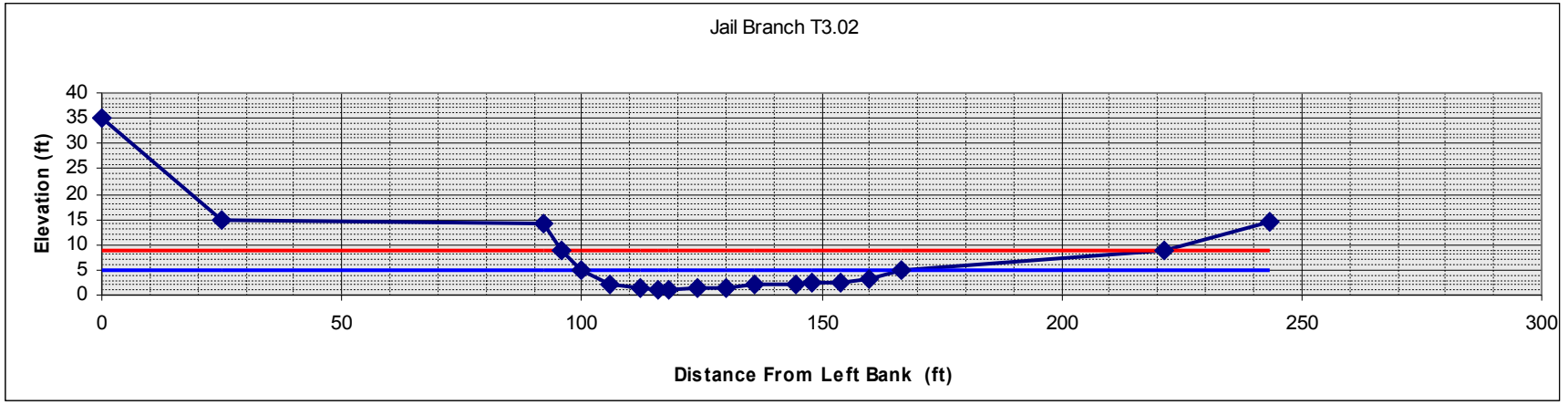
Cross-section for T3.01, segment A



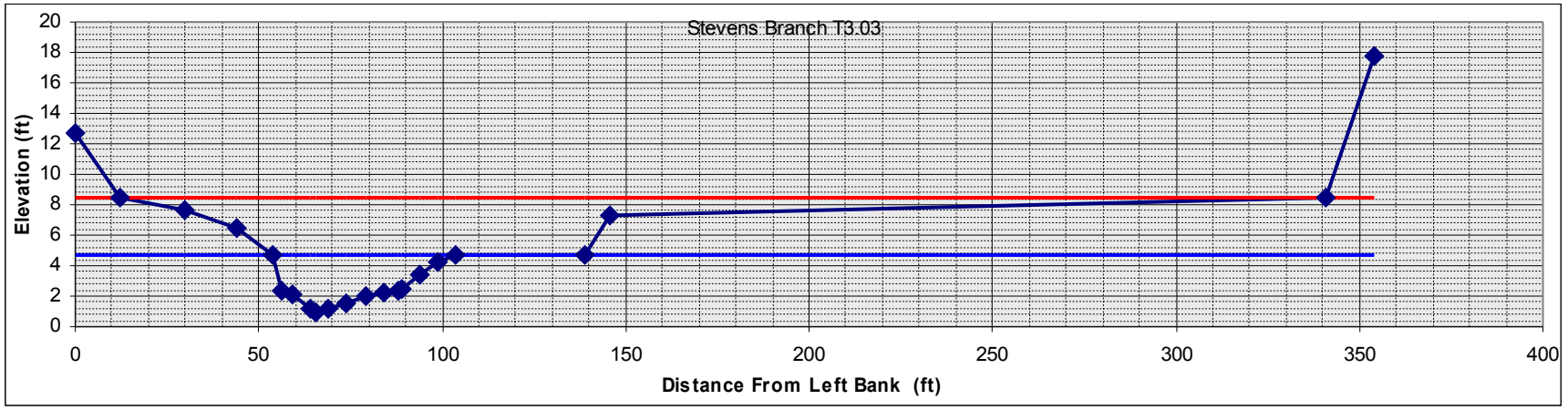
Cross-section for T3.01, segment B



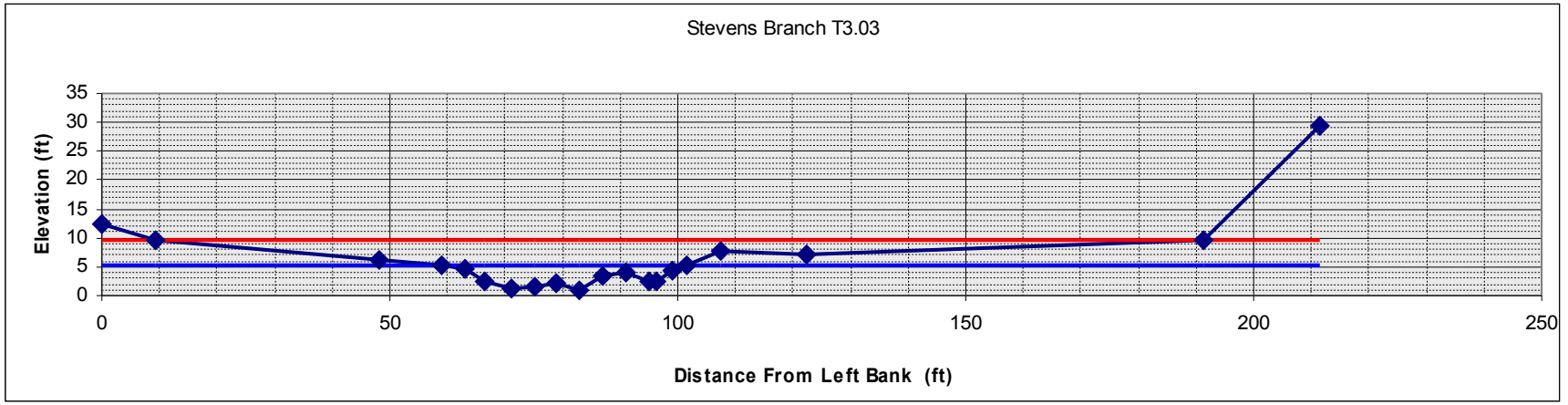
Cross-section for T3.02, segment A



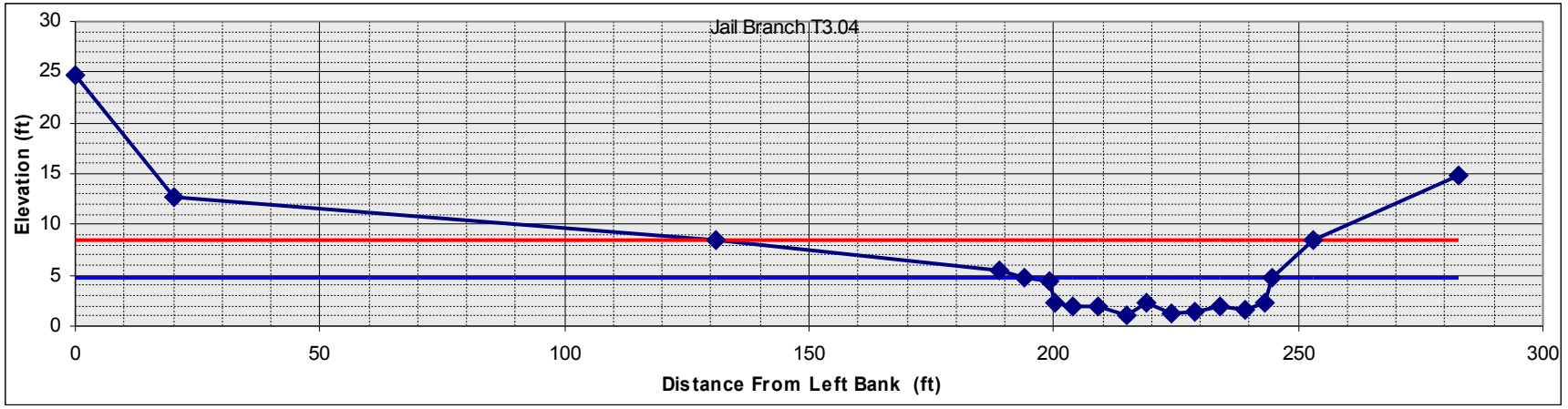
Cross-section for T3.02, segment B



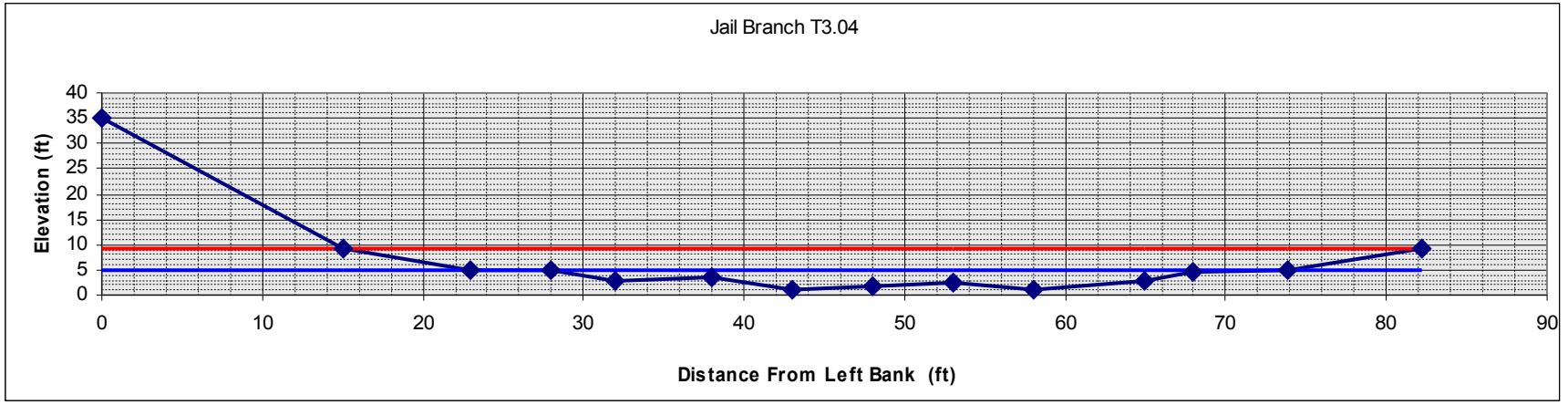
Cross-section for T3.03, segment A



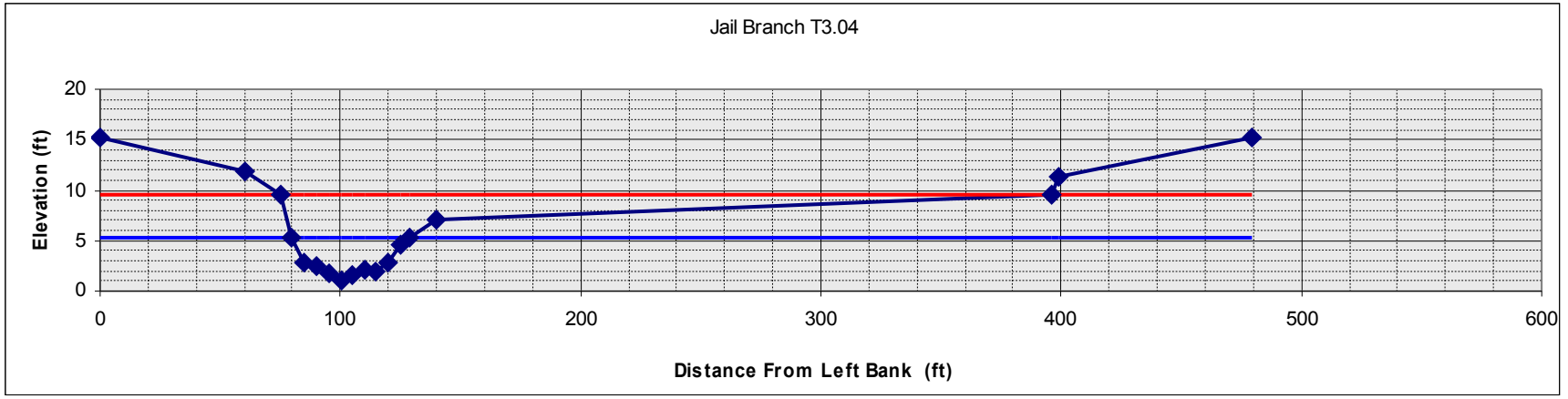
Cross-section for T3.03, segment B



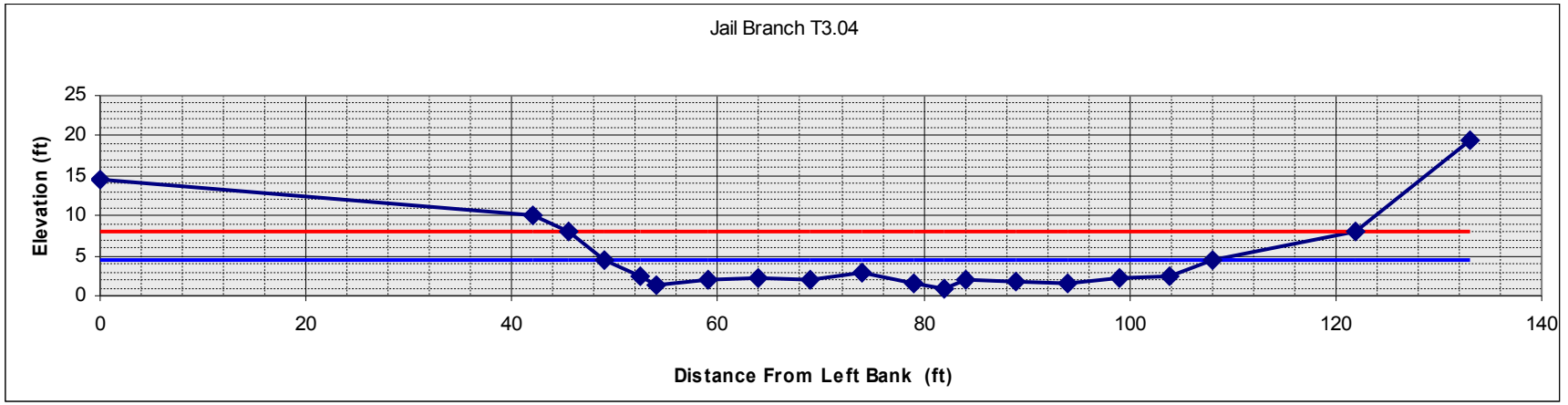
Cross-section for T3.04, segment A



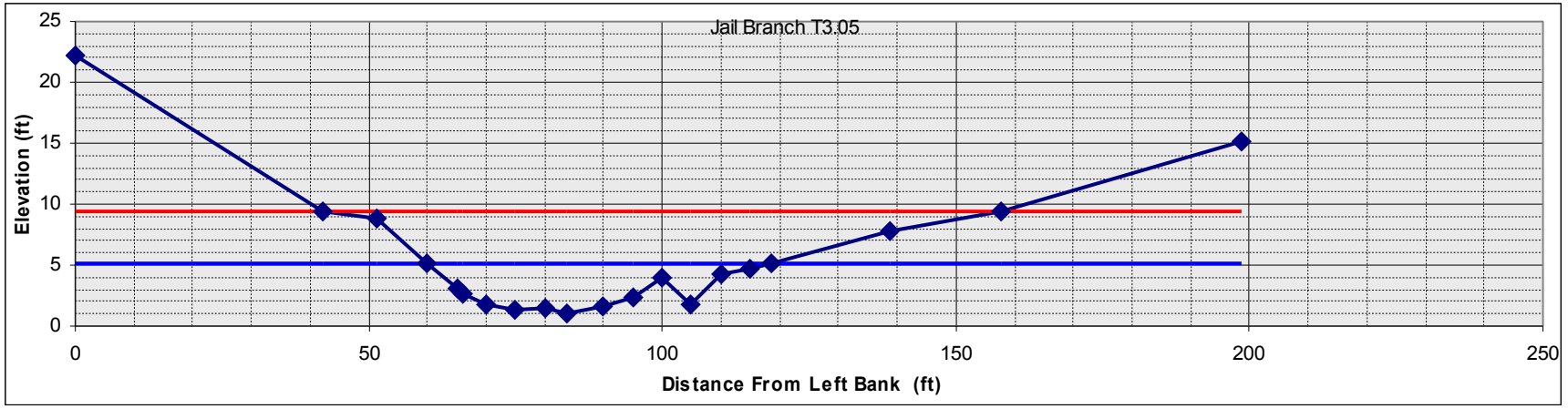
Cross-section for T3.04, segment B



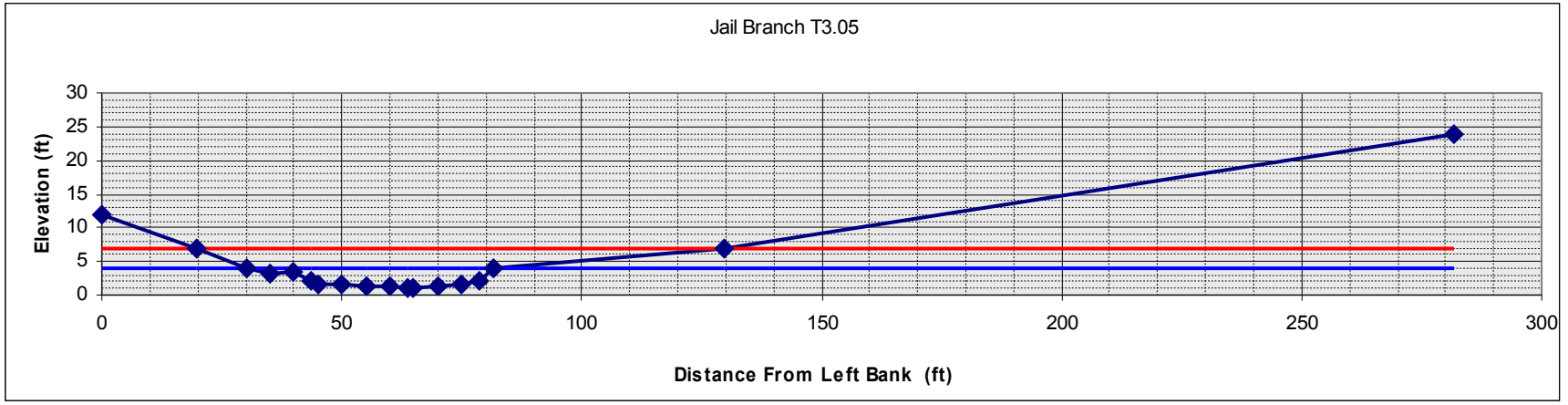
Cross-section for T3.04, segment C



Cross-section for T3.04, segment D

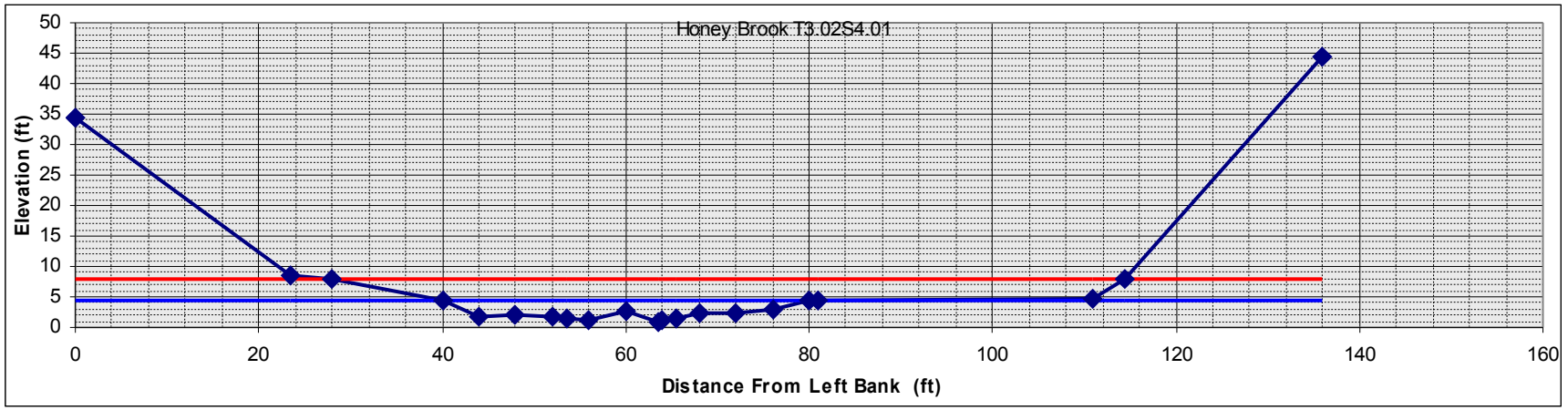


Cross-section for T3.05, segment A

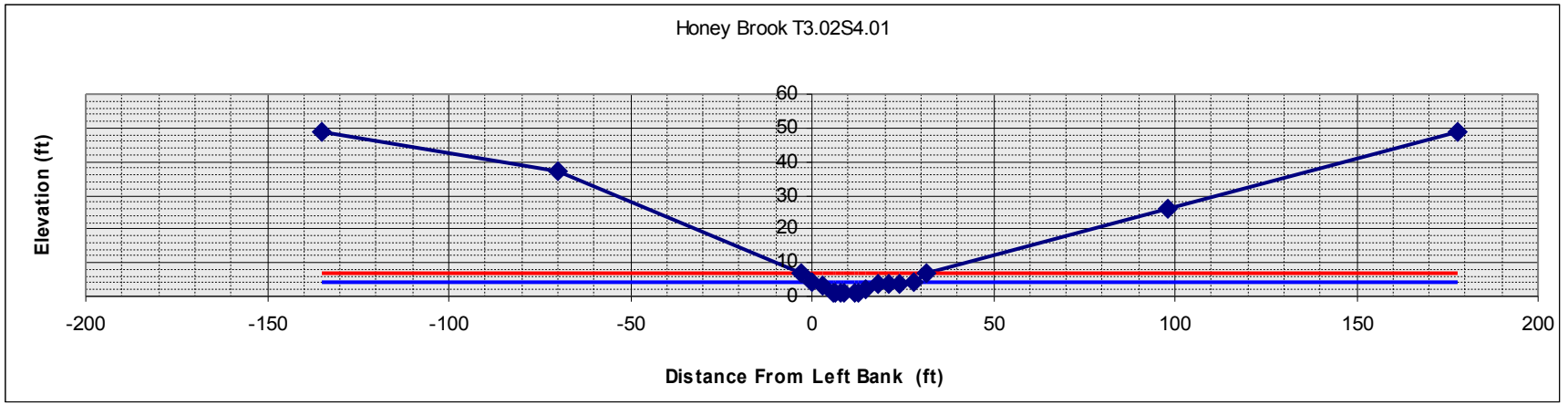


Cross-section for T3.05, segment B

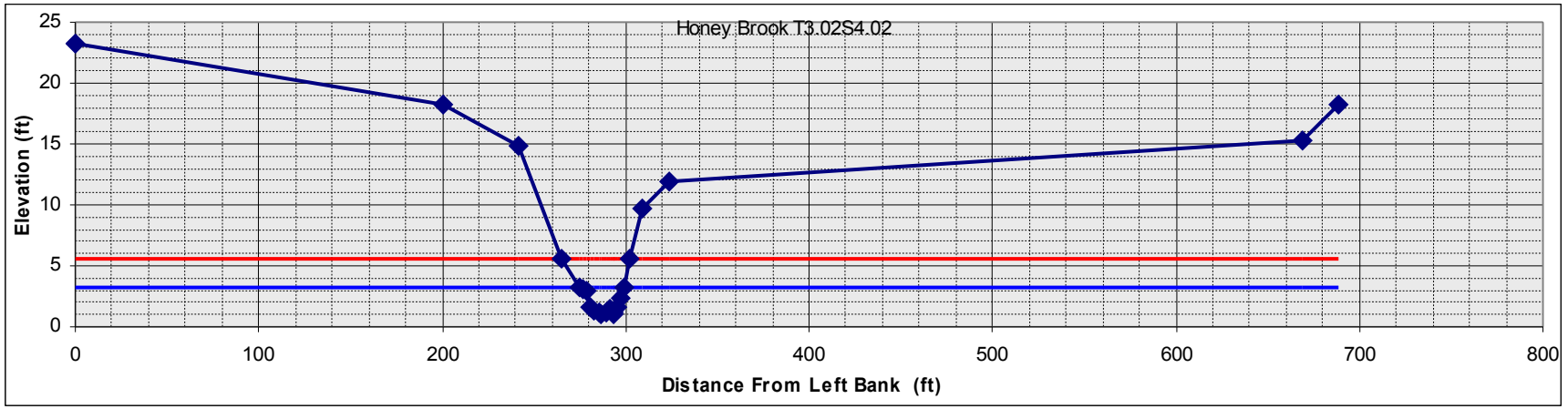
HONEY BROOK



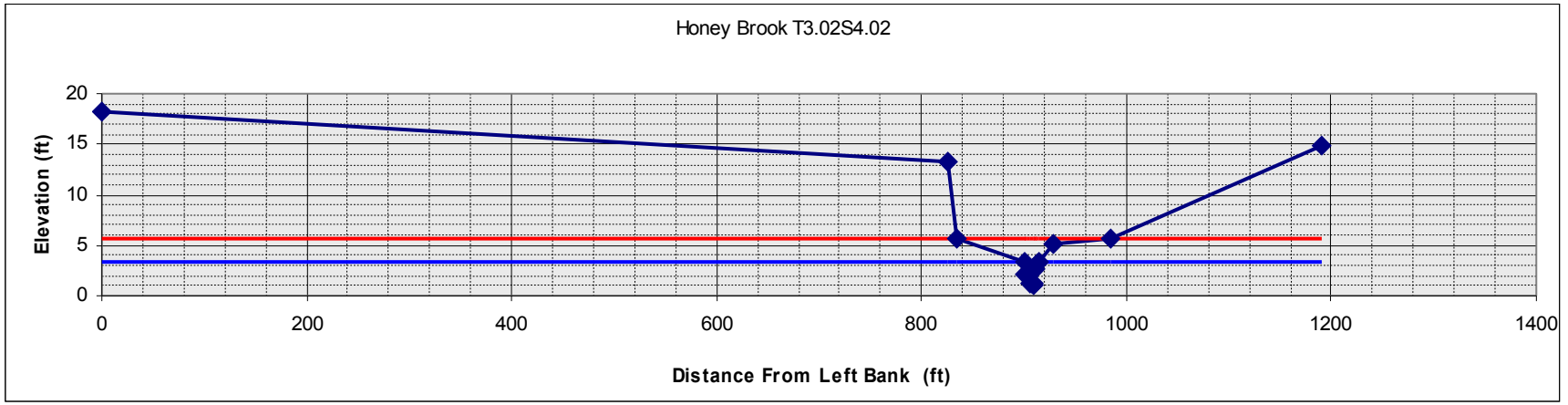
Cross-section for T3.02S4.01, segment A



Cross-section for T3.02S4.01, segment B



Cross-section for T3.02S4.02, segment A



Cross-section for T3.02S4.02, segment B