# Malletts Creek & Allen (Petty) Brook Phase 1 & Phase 2 Stream Geomorphic Assessment Summary Report

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## EXECUTIVE SUMMARY

- The Malletts Creek and Allen (Petty) Brook watersheds are located predominately in the towns of Colchester and Milton, but some sections extend into Westford and Essex. Malletts Creek has a drainage area of 23.7 $Mi^2$ (excluding Allen Brook) and Allen Brook has a drainage area of 5.4 $Mi^2$. The two meet at the confluence with Lake Champlain east of Interstate 89 and west of Route 7. In addition to Allen Brook, six other significant tributaries draining to Malletts Creek were identified in this study. Pond Brook (T2) branches off the main stem west of the Route 7 crossing in the large wetland area. Pond Brook previously had Phase 1 geomorphic assessments conducted by the Fitzgerald Environmental Associates, LLC. for CCRPC and VTDEC. The only tributaries to Malletts Creek that received full Phase 1 assessments in this study were Allen Brook (T1) and portions of tributary 6 (T6).

- A total of 95 reaches were identified during the initial watershed delineation. Of the 95 delineated reaches, 51 reaches were identified for Phase 1 analysis by the CCRPC, VTDEC, and local town officials. A total of 25.2 miles received full Phase 1 assessment. The Phase 1 SGA approach resulted in watershed-scale data about the landscape (e.g., soils and land cover) and the stream channel (e.g., slope and form), providing a basis for understanding the natural and human-impacted conditions within the watershed. The SGA data also aided in the identification of specific stressors affecting the physical conditions of the stream channels and structures (e.g., bridges and culverts).

- Approximately three-quarters (78%) of the assessed reaches are found in an unconfined valley setting that would naturally support channels with E or C-type geometry with coarse equilibrium or fine deposition geomorphic processes. The remaining reaches (22%) are found in a confined valley setting with higher channel slopes, and A or B-type channel geometry. These reaches typically have transport based sediment regimes.

- The majority of the watershed land use is comprised of forested land (57.8%) and agricultural land (24.6%). Developed lands (7.2%) are most commonly found as low density residential areas throughout the watershed, but some higher density areas of industrial and residential development are found in Milton near Route 7. Wetlands and other surface waters represent 7.1% of the watershed area and shrub/scrub lands occupy approximately 3.3%.

- Impact ratings were developed for each reach using the Phase 1 parameters representing four classes of watershed and reach-scale impacts: 1) Land Cover and Reach Hydrology; 2) Channel Modifications; 3) Floodplain Modifications and Planform Changes; 4) Bed and Bank Conditions. Out of a total possible impact score of 32, the average rating for all reaches was 9.9, with a maximum score of 17 and a minimum score of 2.

- Based on the Phase 1 impact ratings, a total of 17 high priority reaches were recommended for Phase 2 assessment. An additional 10 reaches were considered moderate priority, and the remaining 24 reaches were considered low priority for additional assessment. In fall of 2010 CCRPC consulted with Milton and Colchester town officials to select reaches for Phase 2 assessments based on the recommendations. A total of 11 reaches (6.2 miles) were selected for field assessment in fall of 2010.

- In Milton, four (4) reaches on the main stem of Malletts Creek and two (2) reaches on a small tributary were assessed in the field. Beaver activity was common, and historical and ongoing ponding has influenced the character and stability of the channel in many locations. Geomorphic stability and habitat conditions were generally "good" to "fair". One section on upper Malletts Creek, segment M17-B found to the east of East Road, had high quality aquatic habitat. The small tributary entering Malletts Creek from the north is unstable in two locations: 1) south of Main Street crossing where channel was historically straightened and is severely incised (segment T6.01-C); 2) north of Main Street crossing where increased runoff from an upslope residential development is causing channel migration (Reach T6.02).

- The Phase 2 reaches for Allen (Petty) Brook span both Colchester and Milton. In the Colchester portion of Allen Brook, channel conditions varied widely. Stability and habitat was generally "good" to "fair" in the southern portion where historical agricultural land use, modern day development and road crossings have some impact on the conditions. Near the Colchester-Milton town line the brook flows through a nearly pristine area of corridor where stability and habitat was excellent. In the northernmost reach assessed in the field (T1.06), road crossings and recent residential development have impacted the channel conditions, which were "fair".

- One segment (T6.01-C) had severe channel adjustments and has departed from reference conditions primarily due to channel incision and/or straightening. These types of departures result in a conversion of river segments to effective transporters of sediment to downstream areas, with a subsequent loss of storage of sediment and floodwaters within the floodplain.

- A total of eight (8) culverts at road crossings were assessed using the VTDEC methods. None of the assessed culverts are adequately sized to accommodate stream equilibrium conditions. Five (5) of the assessed culverts have widths less than 50% of bankfull channel width and cause significant flood constrictions and reduced aquatic organism passage (AOP). Three (3) culverts have been identified as "high" priorities for replacement or retrofit to address their incompatibility with channel stability and/or AOP.

- Site level approaches to restoration of dynamic equilibrium conditions were evaluated in detail at the reach scale using a step-wise procedure developed by VTANR. This resulted in the identification of 21 unique projects for the study area, including 13 projects that do not require significant further study (i.e., passive approaches such as buffer plantings and corridor protection), and 8 projects requiring further feasibility study or engineering design (i.e., active restoration approaches such as culvert replacements).

## 1.0 PROJECT BACKGROUND

The Chittenden County Regional Planning Commission (CCRPC) and the Vermont Department of Environmental Conservation (VTDEC) identified the Malletts Creek and Allen (Petty) Brook watersheds in northwestern Vermont for assessment of fluvial geomorphic conditions. Fitzgerald Environmental Associates, LLC (FEA) was retained by CCRPC in 2010 to carry out Phase 1 assessments following the Stream Geomorphic Assessment (SGA) Protocols developed by the Vermont River Management Program (RMP). The study was initiated to identify the extent of geomorphic stressors throughout the watershed (e.g., encroachment, development, etc), and to collect preliminary data on the stream's condition.

FEA used the Stream Geomorphic Assessment Tool (SGAT) to develop the baseline GIS data for the watershed in the summer of 2010. The remaining Phase 1 data was collected via windshield surveys and historical research. A total of 95 reaches were identified during the initial watershed delineation. Of the 95 delineated reaches, 51 reaches were identified for Phase 1 analysis by the CCRPC, VTDEC, and local town officials. A total of 25.2 miles received full Phase 1 assessment. The Phase 1 SGA approach results in watershed-scale data about the landscape (e.g., soils and land cover) and the stream channel (e.g., slope and form), providing a basis for understanding the natural and human-impacted conditions within the watershed. The SGA data also aids in the identification of specific stressors affecting the physical conditions of the stream channels and structures (e.g., bridges and culverts). In fall of 2010 CCRPC consulted with Milton and Colchester town officials to select reaches for Phase 2 assessments based on the recommendations. A total of 11 reaches (6.2 miles) were selected for field assessment in fall of 2010. This report summarizes the results of the Phase 1 and 2 SGA, and the preliminary restoration projects identified as part of this planning effort.

The overall goal of the RMP is to "manage toward, protect, and restore the fluvial geomorphic equilibrium condition of Vermont rivers by resolving conflicts between human investments and river dynamics in the most economically and ecologically sustainable manner," (VTANR, 2010) achieved through: 1) Fluvial erosion hazard (FEH) mitigation, 2) Sediment and nutrient load reduction, and 3) Aquatic and riparian habitat protection and restoration.

The SGA study of the Malletts Creek and Allen (Petty) Brook watersheds provides:

1) A basis for understanding the overall causes of channel instability and habitat degradation
2) The data needed to develop FEH Zones for the study area
3) A list of preliminary corridor restoration projects that can be further developed in the future to mitigate flood and erosion hazards in the watershed

## 2.0 WATERSHED BACKGROUND

### 2.1 GEOGRAPHIC SETTING AND LAND USE HISTORY

The Malletts Creek and Allen (Petty) Brook watershed is located in northwestern Chittenden County, Vermont (Figure 2.1). This area of the state is part of the upper Lake Champlain drainage. The Malletts Creek watershed, which includes Pond Brook, has a drainage area of 23.6 square miles and outlets to Lake Champlain east of the Interstate 89 crossing at Malletts Bay. The Allen (Petty) Brook watershed is lumped into the Malletts Creek for this study, but actually is an independent watershed draining into Lake Champlain at the same location as Malletts Creek. The Allen Brook watershed has a drainage area of 5.4 square miles. The watersheds are found predominately in the towns of Colchester and Milton, but some sections extend into Westford and Essex. In addition to Allen Brook, which meets Malletts Creek at the confluence with Lake Champlain, six other significant tributaries draining to Malletts Creek were identified in this study. Pond Brook (T2) branches off the main stem west of the Route 7 crossing in the large wetland area. Pond Brook previously had Phase 1 geomorphic assessments conducted by the FEA for the CCRPC and VTDEC. Only Allen Brook (T1) and portions of tributary 6 (T6) received full Phase 1 assessments in this study.

Land cover data based on imagery from 2006 (NOAA, 2008a) are summarized in Table 2.1 and Figure 2.2. The Malletts Creek is drained by a rural watershed, with forest and agriculture representing the dominant cover types with 60.3% and 25.1%, respectively. Allen (Petty) Brook has a much higher proportion of the watershed that is developed (17.5%) with less forested lands (46.5%). The most concentrated areas of development are primarily found to the east of Interstate 89 south of downtown Milton. Much of the agricultural lands within the two watersheds are for hay production and pasture land (NOAA, 2008a). There is a significant area of wetlands in both the Allen Brook and Malletts Creek watersheds with 10.0% and 4.9%, respectively.

**Table 2.1** Land Use/Land Cover data for the Malletts Creek and Allen (Petty) Brook watershed

| Land Cover/ Land Use Type | Malletts Creek* | Allen (Petty) Brook | Pond Brook | All Phase 1 Reaches** | Entire Watershed |
|---|---|---|---|---|---|
| Agriculture | 25.1% | 22.9% | 19.4% | 32.2% | 24.6% |
| Development | 4.8% | 17.5% | 5.6% | 6.9% | 7.2% |
| Forest | 60.3% | 46.5% | 61.0% | 50.5% | 57.8% |
| Open Water | 1.5% | 0.1% | 6.3% | 0.5% | 1.2% |
| Scrub/Shrub | 3.4% | 3.0% | 5.8% | 3.0% | 3.3% |
| Wetland | 4.9% | 10.0% | 1.9% | 6.9% | 5.9% |
| Drainage Area ($Mi^2$) | 23.7 | 5.4 | 4.5 | 10.3 | 29.1 |

*Malletts Creek excludes Allen (Petty) Brook, but includes Pond Brook; **Phase 1 reaches include 51 assessed reaches in both watersheds

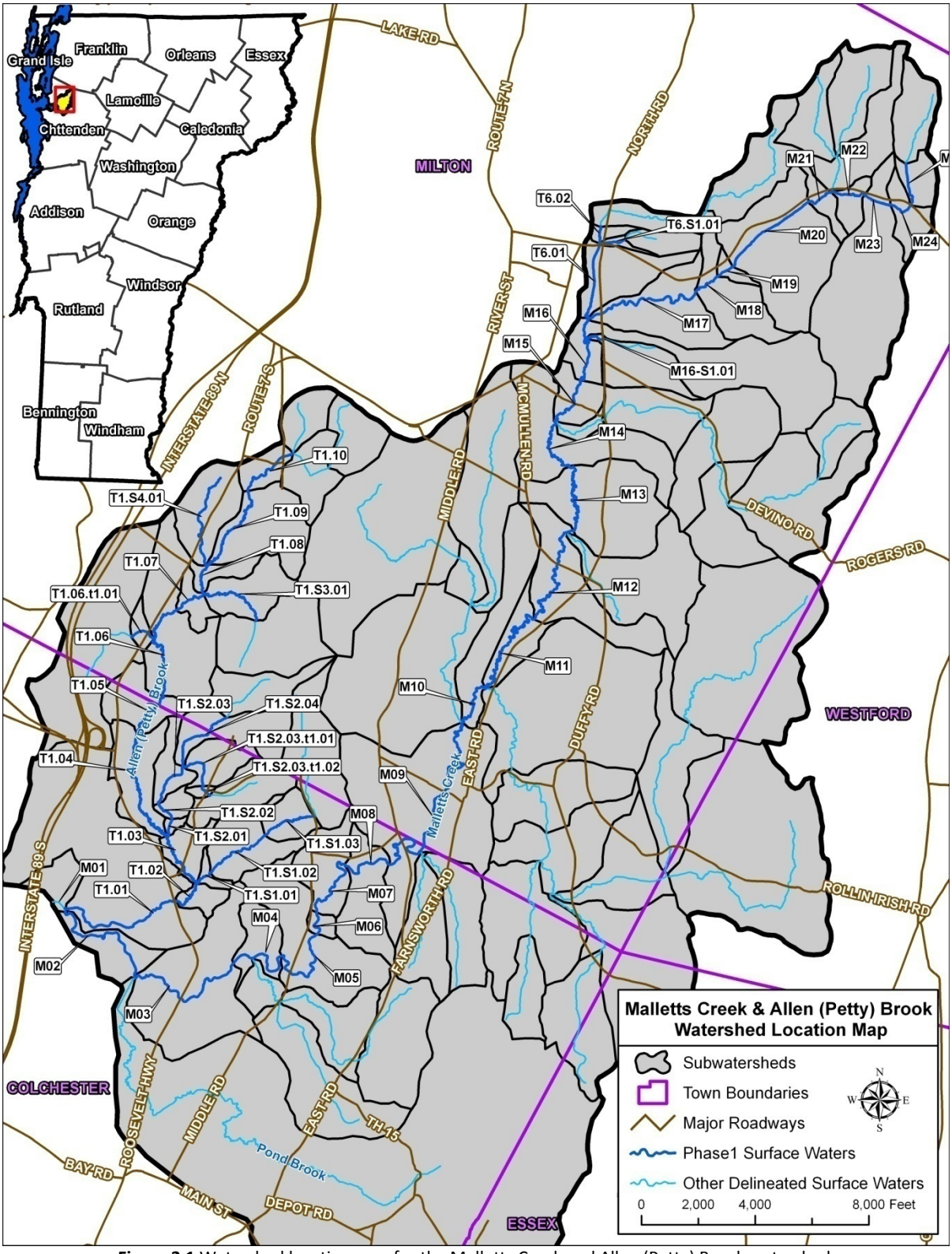



**Figure 2.1** Watershed location map for the Malletts Creek and Allen (Petty) Brook watershed

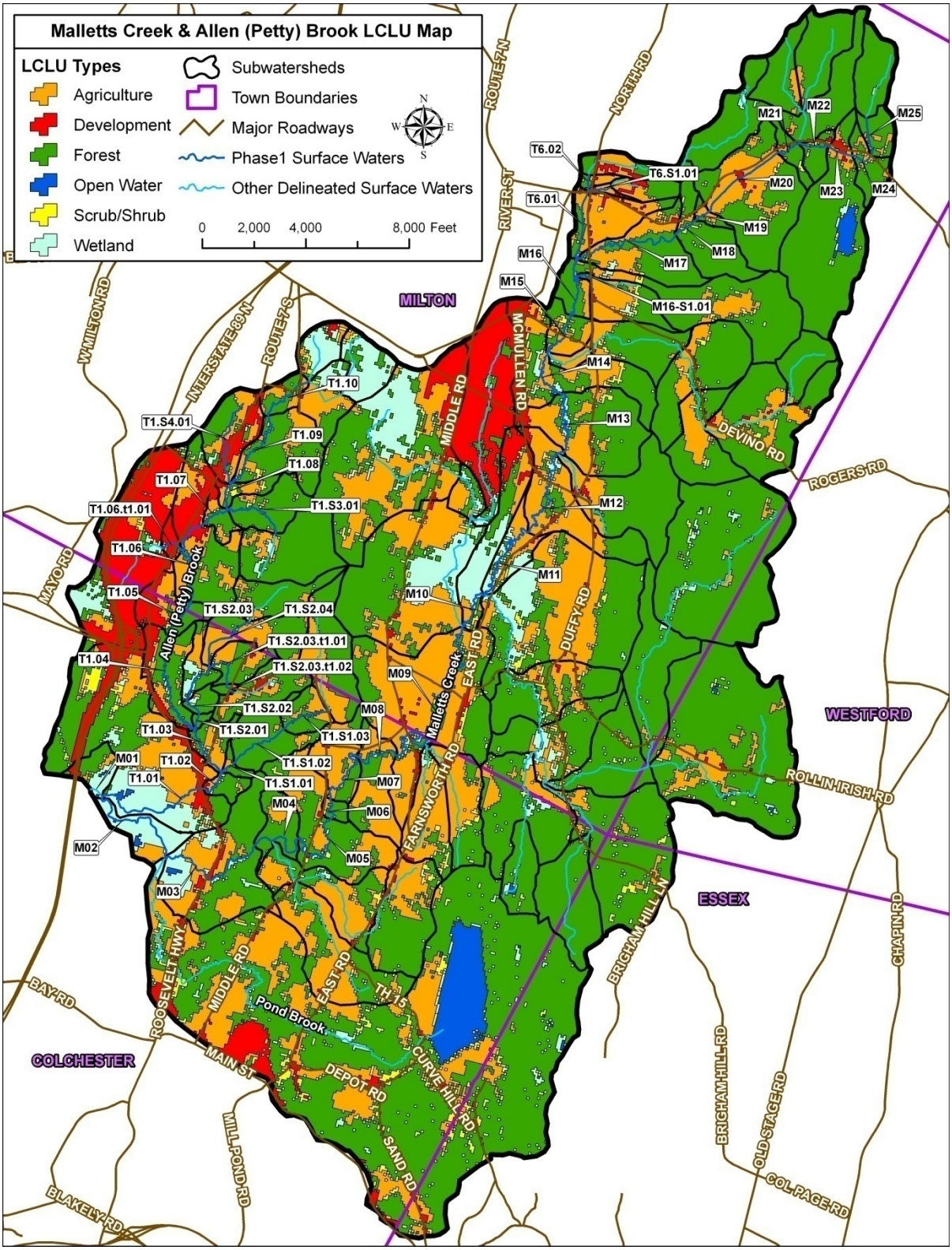



**Figure 2.2** Watershed Land Cover/Land Use for the Malletts Creek and Allen (Petty) Brook watershed

*Historical Land Uses*

The Malletts Creek and Allen Brook watersheds, like much of the state of Vermont, were largely devoid of forest vegetation in the middle part of the 1800's (Albers, 2000). This watershed-scale impact, along with the direct impacts to the channel associated with clearing and farming (e.g., straightening), left scars that are still healing today. In the absence of historic aerial photographs which predate 1937, only anecdotal information from historical records can be used to piece together the story of the watershed and its land use. Nevertheless, historic aerial photos taken in 1937 and 1962 provide a basis for using time-lapse analysis to understand the extent of the forest clearing and subsequent recovery in the 1900's as the economy shifted away from the traditional pastoral land uses.

As Vermont's farmers began to move to the Midwest in search of more productive farmland in the mid to late 1800's, the deciduous forests along the mountain and foothill slopes began to recover (Albers, 2000). Throughout the early and mid 1900's, as more family farms found on marginal lands were given up, the forests continued to recover (Figure 2.3 & Figure 2.4).


**Figure 2.3** Upper headwaters area in 1962 where the channel crosses over Westford Road; note lack of trees

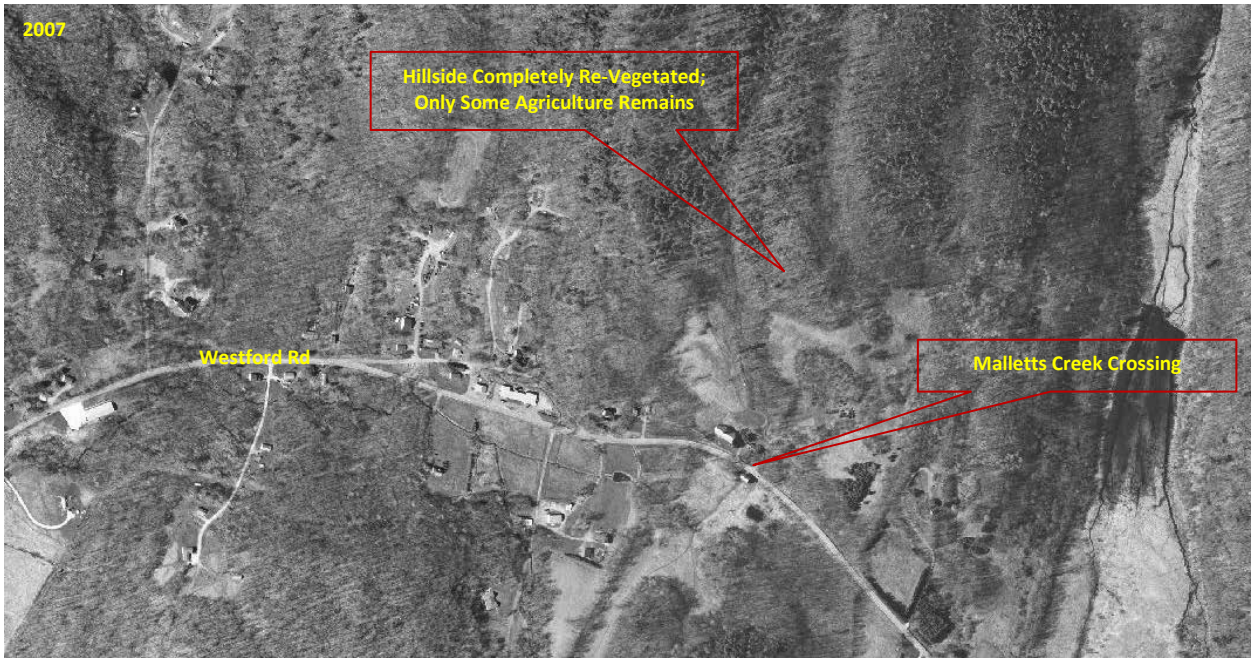



**Figure 2.4** Upper headwaters area in 2007 where the channel crosses over Westford Road; note lack of agriculture

## 2.2 GEOLOGIC AND GEOMORPHIC SETTING

*Geologic Setting*

The Malletts Creek/Allen Brook watershed lies in the Northern Champlain Valley. Its surficial geology and soils have been shaped by three dominant processes of the landscape change since the last period of glaciation: 1) Retreat of the Laurentide Ice Sheet; 2) Presence of Glacial Lake Vermont and the Champlain Sea; 3) Deposition from the Lamoille River. Each of these historic geologic processes help to describe the current distribution of soil characteristics found throughout the watershed today.

As the Laurentide Ice Sheet retreated from Vermont approximately 14,000 years ago it left behind a "tongue" of ice extending through the lower elevations of the Champlain Valley. During a glacial retreat the rate of ice melt exceeds the rate at which the ice is flowing. For the Laurentide Ice Sheet this process and the southward movement (flow) that preceded it left a barren landscape with glacial till soils. During the retreat of the glaciers, a large freshwater lake formed as the melt water draining to the north was blocked by the remaining "tongue" of ice in the northern Champlain Valley. The blockage of ice to the north created Glacial Lake Vermont (Figure 2.5). At this time the elevation of water was approximately 620 feet above sea level. Approximately 2,000 years later, as the ice sheet receded farther to the north, the freshwater of Lake Vermont broke through the ice blockage and spilled out the Saint Lawrence Valley. The water became brackish as the elevation of water equilibrated between the lake, now called the Champlain Sea, and the Atlantic Ocean. During this time the water elevation was approximately 320 feet above sea level. The Champlain Sea persisted for approximately 2,000 years as the land of northern Vermont isostatically rebounded from the mass of the Laurentide Ice Sheet (Wright, 2003).

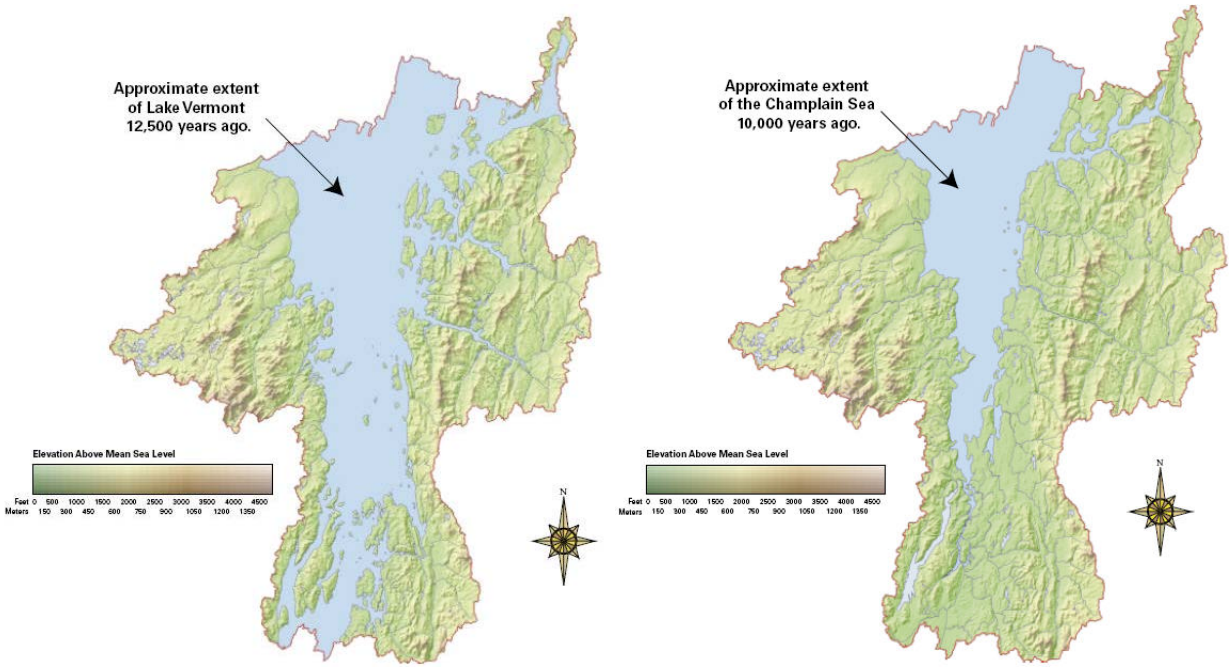



**Figure 2.5** Spatial extents of Glacial Lake Vermont and the Champlain Sea (LCBP, 2004)

The presence of Glacial Lake Vermont and the Champlain Sea shaped the soils that are presently found in the watershed, especially throughout the southern and eastern portions. During this historic period of Lake Vermont, the surface elevation of the water extended up to the foothills of the mountains to the East of East Road. Due to the quiescent waters of the Lake, large amounts of fine sediment settled in these areas, leaving behind the silt and sand rich soils found throughout the watershed today. The only section of the watershed that was not greatly affected by the presence of Lake Vermont was the upper headwaters of along the eastern portion of the basin, where till soils are dominant. The surficial geology of the lower part of the watershed is dominated by a mix of silts, sands and coarse gravels associated with deposition in the Lake. In the northwestern watershed, in Milton, outwash soils associated with the historical Lamoille River floodplain are present. This outwash area represents an ancient delta of the Lamoille River where coarser substrates were deposited during the time of the Champlain Sea when water from the Green Mountains deposited in large deltas extending to the west into the Sea.

*Geomorphic Setting*

The Malletts Creek and Allen (Petty) Brook watersheds are two small drainages that enter directly into Lake Champlain. For the purpose of this analysis Petty Brook has been considered a tributary (T1) to Malletts Creek. Malletts Creek has seven significant tributaries off the main stem and several small sub-tributaries. The main stem of Malletts Creek (Reaches M01-M25) has an overall channel slope of 1.0%, with the majority of the slope change occurring in the upper watershed as the channel heads to the east paralleling Westford Road. The watershed tends to have unconfined valley types where the channel passes through the wide valleys what was once the bottom of Glacial Lake Vermont. Significant changes

in channel slope are only found in areas where bedrock grade controls exist or the valley is naturally narrow. A large portion of the main stem surface waters are slow-moving, meandering E-type channels with sand and fine gravel substrates.

Allen Brook (T1.01-T1.10) has an average channel slope of 0.7%. Valley characteristics and reference channel setting is very similar to that of the main stem. Low sloped E-type and C-type channels with unconfined valleys and dune-ripple and riffle-pool bedform are most common. The sub-tributaries that branch off of Allen Brook tend to have slightly higher slopes and are more likely to have gravel substrate and riffle-pool bedform. Where the valley is confined or narrow the reference morphology tends to be B-type.

### 2.3 ECOLOGICAL SETTING

The Malletts Creek and Allen Brook watershed is found within the Champlain Valley (CV) biophysical region (Thompson and Sorenson, 2000). The CV region extends from just north of Rutland up to the Canadian border, and is bound to the west by Lake Champlain and to the east by the foothills of the Green Mountains. The CV is much warmer and somewhat dryer than the other biophysical regions of the state. In South Burlington the average temperature is 45 degrees Fahrenheit and the average annual rainfall is 36.1 inches (NOAA, 2008b). As discussed above in the summary of the geological setting, the CV has been shaped by the presence of Lake Vermont and the Champlain Sea, leaving behind fine grained soils rich in calcium and well suited for agriculture. As such, much of the CV, including the Malletts Creek and Allen Brook watershed, was extensively developed for agricultural uses during its original settlement in the 1700's and 1800's.

Very few areas of the original plant communities that occupied the CV exist today, as most were cleared for agriculture. Three forest types, in addition to the beaver meadows common along the Malletts Creek channel, likely occupied the watershed: 1) Sandplain forest: areas of coarse alluvial and outwash substrate in the northwestern watershed where the Lamoille delta once was likely supported forests with white pine, pitch pine, oaks, and red maple; 2) Clayplain forest: in the lower watershed around where heavy lacustrine clays are found, the forest was likely comprised of red maple, beech, white ash, and various species of the white oak subfamily; 3) Northern Hardwood: in the upland areas where till soils are found, the forest was likely comprised of maple, birch and beech trees.

Elevations within the watershed range from 98 feet at the confluence with Lake Champlain, up to approximately 1,390 feet in the headwaters to the north of Westford Road. Extensive wetlands occupy large areas within the watershed (NWI, 2004). In total about 6.0% of the watershed is considered to be wetland (NOAA, 2008a). The floodplain corridor throughout the majority of the watershed is classified as wetland. The main stem has two large wetland complexes in addition to the wetlands found in the corridor. One is near Lake Champlain and the other is located mid-watershed in reaches M10 to M15

(NWI, 2004). Allen Brook has a large wetland complex near the confluence with Lake Champlain and another large wetland found near the headwaters reaches T1.11 and T.12.

Throughout the study area the low slope makes for excellent beaver habitat. Many reaches are currently experiencing beaver activity or recovering from past beaver dams that have been breached. These natural sediment sinks have likely reduced the sediment load to the lake. The mouth of the Malletts Creek at the confluence with Lake Champlain has changed considerably in the last 70 years. In 1937 the mouth was well developed-with sediment pouring out into the lake (Figure 2.6). Currently, little sediment appears to be reaching the lake from the upslope watershed. The present increase in beaver activity and decrease in agricultural land use directly decreases the total sediment flux out of the watershed (Figure 2.7).

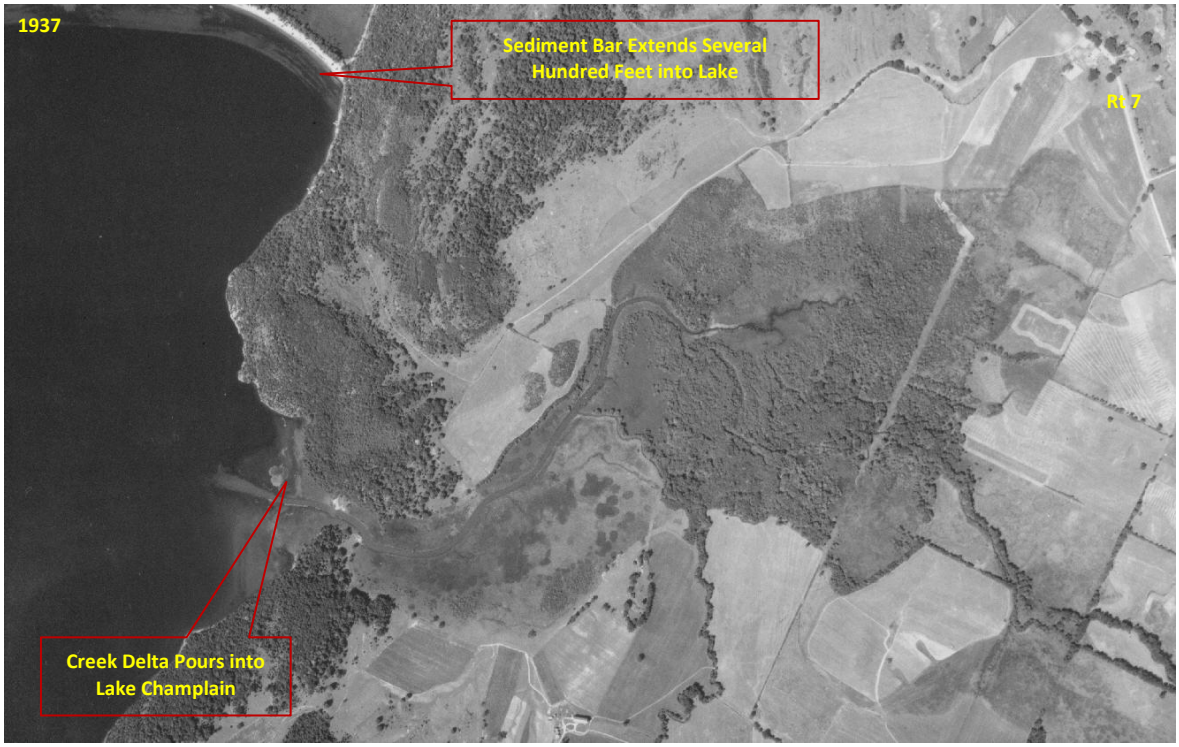



**Figure 2.6** Mouth of Malletts Creek with Lake Champlain in August, 1937


**Figure 2.7** Mouth of Malletts Creek with Lake Champlain in May, 2007

## 3.0 METHODS

### 3.1 DATA COLLECTION METHODS

The Vermont River Management Program (RMP) has invested many person-years of effort into developing a state-of-the-art system of Stream Geomorphic Assessment (SGA) protocols. The SGA protocols are intended to be used by resource managers, community watershed groups, municipalities and others to identify how changes to land use affect hydro-geomorphic processes at the landscape and reach scale, and how these changes alter the physical structure and biological habitat of streams in Vermont. The SGA protocols have become a key tool in the prioritization of restoration projects that will 1) reduce sediment and nutrient loading to downstream receiving waters such as Lake Champlain and the Connecticut River, 2) reduce the risk of property damage from flooding and erosion, and 3) enhance the quality of in stream biological habitat. The protocols are based on defensible scientific principles and have been tested widely in many watersheds throughout the state.

The SGA protocols include three phases (VTANR, 2007; VTANR, 2009a; VTANR 2009b):

- **Phase 1**: The Phase 1 SGA approach utilizes the Stream Geomorphic Assessment Tool (SGAT), a GIS extension developed by RMP for the collection of reach and watershed scale data. In addition to the GIS and remote sensing effort, a cursory field assessment ("windshield survey") is included for the verification of stream and valley forms, significant channel features and the location of

man-made infrastructure. The Phase 1 SGA approach results in watershed-scale data about the landscape (e.g., soils and land cover) and the stream channel (e.g., slope and form), which provides a basis for understanding the natural and human-impacted conditions within the watershed. The SGA data also aids in the identification of specific stressors affecting the physical conditions of the stream channels and structures (e.g., bridges and culverts). Table 3.1 summarizes the parameters collected in Phase 1 using the Feature Indexing Tool (FIT), which include those utilized to develop the final impact ratings (VTANR, 2007).

- **Phase 2**: The Phase 2 approach builds upon Phase 1 data through the collection of reach-specific data about the current physical conditions. Characterization of reach conditions utilizes a suite of quantitative (e.g., channel geometry, pebble counts) and qualitative (e.g., pool-riffle habitat) measurements to calculate two indices: Rapid Geomorphic Assessment (RGA) Score; Rapid Habitat Assessment (RHA) score. Using the RGA scores in conjunction with knowledge about the background or "reference" conditions, a sensitivity rating is developed to predict the degree to which the channel will adjust to human impacts in the future. Table 3.1 summarizes the parameters collected and verified in Phase 2 using the Feature Indexing Tool (FIT; VTANR, 2009a).

**Table 3.1** Parameters collected with FIT

| Phase 1 Step | Phase 2 Step | Data Type | Impact | Sub-Impact |
|---|---|---|---|---|
| **3.1** | **1.2** | Point | Alluvial Fan | NA |
| **3.2** | **1.6** | Point | Grade Control | Dam, Ledge, Waterfall, or Weir |
| **NA** | **3.3** | Point | Mass Failure | NA |
| **5.5** | **5.5** | Point | Dredging | Dredging, Gravel Mining, or Commercial Mining |
| **NA** | **4.4** | Point | Debris Jam | NA |
| **NA** | **4.6** | Point | Stormwater Input | NA |
| **NA** | **4.9** | Point | Beaver Dam | NA |
| **NA** | **5.2** | Point | Migration | Neck Cut Off, Flood chute, Avulsion, or Braiding |
| **NA** | **5.3** | Point | Steep Riffle or Head Cut | Head Cut or Steep Riffle |
| **NA** | **5.4** | Point | Stream Crossing | Stream Ford or Animal Crossing |
| **NA** | **3.3** | Point | Gully | NA |
| **6.2** | **1.3** | Line | Development | NA |
| **6.1** | **1.3** | Line | Encroachment | Berm, Improved Path, Road, or Railroad |
| **5.3** | **3.1** | Line | Bank Revetment | Rip-Rap, Hard Bank or Other |
| **7.2** | **3.1** | Line | Erosion | NA |
| **5.4** | **5.5** | Line | Straightening | Straightening or With Windrowing |

- **Phase 3**: Phase 3 surveys involve the collection of detailed, reach-scale survey data to verify or build upon Phase 2 data. These surveys are typically carried out prior to project development for an "active" channel management approach (e.g., floodplain restoration), or for long-term monitoring purposes (VTANR, 2009b).

During the summer of 2010 FEA used SGAT to develop the baseline data layers for the watershed. The remaining Phase 1 data has been collected remotely and with windshield surveys for the 51 reaches along 25.2 river miles. All major human impacts and natural features were indexed in a GIS using the Feature Indexing Tool (FIT). Following the completion of the Phase 1 assessment in the summer of 2010, FEA was contracted to conduct Phase 2 assessments on 11 additional reaches along 6.3 river miles. Detailed field sketches as well as channel cross-sections were taken in each reach according to the Phase 2 SGA protocol (VTANR, 2009a). Where appropriate reaches were segmented based on higher quality field observations or property access restrictions. In total, the 11 reaches assessed were subdivided into 18 segments. Results from the Phase 2 assessment were used to identify preliminary restoration projects. Table 3.2 provides the scope for all Phase 1 and Phase 2 assessed reaches.

**Table 3.2** Phase 1 and Phase 2 assessment scope summary for Malletts Creek and Allen Brook

| Surface Water | Assessed Reaches | | Assessed River Length (Miles) | | Number of Assessed Reaches | |
|---|---|---|---|---|---|---|
| | Phase 1 | Phase 2 | Ph 1 | Ph 2 | Ph 1 | Ph 2 |
| Malletts Creek | M01-M25 & M16-S1.01 | M14-M17 | 14.6 | 2.5 | 26 | 4 |
| Allen (Petty) Brook | T1.01-T1.10 & T1.06.t1.01 | T1.02-T1.06 | 5.9 | 3.1 | 11 | 5 |
| Unnamed Tributary | T6.01, T6.02, & T6.S1.01 | T6.01 & T6.02 | 0.8 | 0.7 | 3 | 2 |
| Unnamed Tributary | T1.S1.01-T1.S1.03 | Not Assessed | 1.0 | NA | 3 | NA |
| Unnamed Tributary | T1.S2.01-T1.S2.04, T1.S2.03.t1.01, & t1.02 | Not Assessed | 1.6 | NA | 6 | NA |
| Unnamed Tributary | T1.S3.01 | Not Assessed | 0.6 | NA | 1 | NA |
| Unnamed Tributary | T1.S4.01 | Not Assessed | 0.7 | NA | 1 | NA |
| | | **Totals:** | **25.2** | **6.3** | **51** | **11** |

## 3.2 Bridge and Culvert Assessments

FEA conducted bridge and culvert surveys on all private and public structures within the selected Phase 2 reaches. The Bridge and Culvert Assessment and Survey Protocols specified in Appendix G of the Vermont Stream Geomorphic Assessment Handbook (VTANR, 2009a) were followed. Latitude and Longitude at each of the structures was determined using a GPS unit. The assessment included various photos documenting the conditions of each structure.

The Vermont Culvert Geomorphic Screening tool (MMI, 2008a) and the Vermont Culvert Aquatic Organism Passage Screening Tool (MMI, 2008b) developed by Milone and MacBroom, Inc. for VTDEC were used to identify culverts within the Malletts Creek and Allen Brook watershed that have a higher priority for replacement/retrofit due to geomorphic incompatibility and/or for being potential barriers to movement and migration of aquatic organisms.

## 3.3 Stressor and Departure Analysis

FEA followed the VTDEC methods for developing river corridor plans as outlined in the Vermont River Corridor Planning Guide (VTANR, 2010). This technical guide is directed towards river scientists, planners, and engineers engaged in finding economically and ecologically sustainable solutions to the conflicts between human investments and river dynamics. The guide provides explanations for the following:

- River science and societal benefits of managing streams in a sustainable manner toward equilibrium conditions
- Methods for assessing and mapping stream geomorphic conditions, and identifying and prioritizing river corridor protection and restoration projects
- Methods for examining project feasibility and negotiating management alternatives with stakeholders
- Information on current programs available to Vermont landowners, towns, and other interested parties to implement river corridor protection and restoration projects

Included in this approach is a mapping exercise to lay the foundation for understanding stressors on stream channel stability at the watershed and reach scales. These maps are compiled as part of the departure and sensitivity analysis, and illustrate a gradient of human impacts and stream response across the watershed. The maps provide a basis for identifying projects through a step-wise procedure to screen potential projects for compatibility with long-term equilibrium conditions.

### *3.3.1 Stressor Analysis*

The data collected through the Phase 1 and 2 SGA studies provides the basis for assessing the impacts to the hydrologic and sediment regimes, and the channel riparian and boundary conditions. This data, when combined with other watershed-scale data developed in this study, allows for the assessment of physical departure from reference conditions, and serves to validate watershed-scale patterns and stream conditions observed in the field.

Stressor, departure and sensitivity maps have been prepared to depict the effects of significant physical processes occurring within the study area. These maps provide an indication of where channel adjustment processes have been altered, at both the watershed-scale and the reach-scale. The analysis of existing and historic departures from equilibrium conditions along a stream network allows for the prediction of future channel adjustments. This is helpful in developing and prioritizing potential river corridor protection and restoration projects.

### *3.3.2 Departure Analysis*

Much research has shown that alluvial river channels in wide valleys will adjust their geometry and planform to accommodate changes in the discharge and sediment loading from the upslope watershed (Dunne and Leopold, 1978). This concept was summarized by Lane (1955) to show that

stream power and sediment (size and distribution) will seek a dynamic equilibrium condition in the absence of anthropogenic disturbance or catastrophic natural storm events. Slight changes from one year to another, such as variation in rainfall amounts (and a resulting variation in discharge), may cause subtle changes in channel form. However, the cross-sectional shape and profile of a river is typically stable under reference watershed conditions, and predictable given knowledge about: 1) the geologic conditions of the watershed and river corridor, 2) the topography of the watershed and river corridor, and 3) the regional climate.

Channel evolution models (CEM) also provide a basis for understanding the temporal scale of channel adjustments and departure in the context of SGA Phase 2 results. Both the "D" stage and "F" stage CEMs (VTDEC, 2009) are helpful for explaining the channel adjustment processes underway in the Mallets Creek watershed. The "F" stage CEM is used to understand the process that occurs when a stream degrades (incises) its bed. The more dominant adjustment process for the "D" stage channel evolution is aggradation, widening and planform change. D-stage CEM typically occurs where grade controls prevent severe channel incision and abandonment of the adjacent floodplain. The common stages of both CEMs are depicted in Figure 3.1 below.

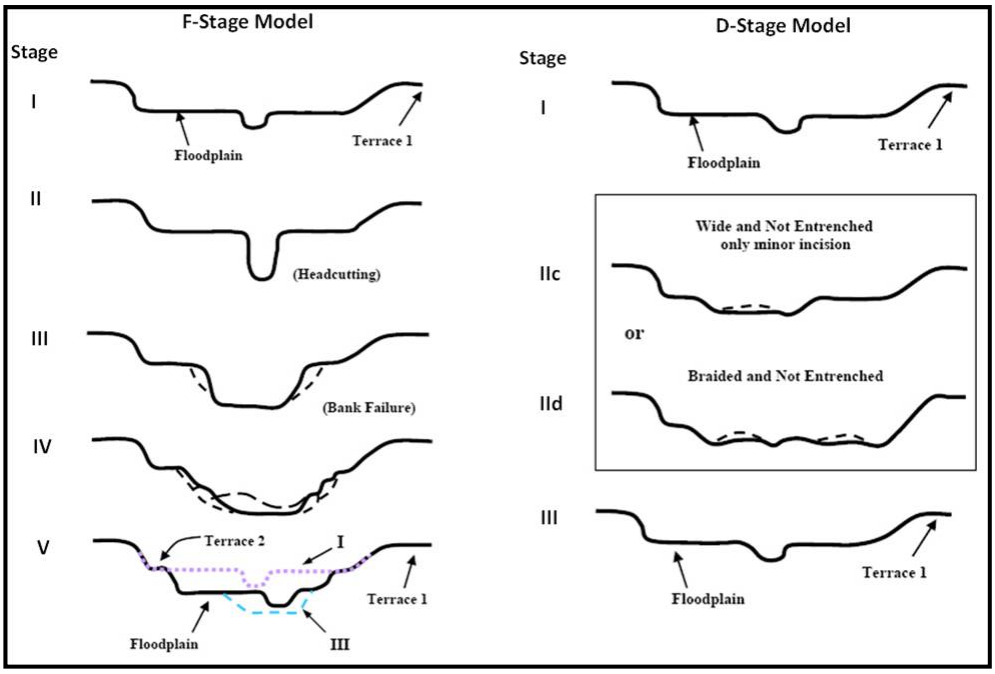



**Figure 3.1** Typical channel evolution models for F-stage and D-stage (VTDEC, 2009)

Analysis of a watershed's sediment regime is a useful approach for summarizing the reach and watershed-scale stressors affecting the equilibrium conditions of river channels. Sediment regime mapping provides a context for understanding the sediment transport and channel evolution processes (Schumm, 1977) which govern changes in geometry and planform for river channels in

a state of disequilibrium. The VTANR River Corridor Planning Guide (VTANR, 2010) outlines a methodology for understanding the reference and altered sediment regimes of reaches according to data collected during the Phase 2 field assessments. The sediment regime types used in this analysis are summarized below in Table 3.3.

**Table 3.3** Sediment regime types for corridor planning (VTANR, 2010)

| Sediment Regime | Narrative Description |
|---|---|
| **Transport** | Steeper bedrock and boulder/cobble cascade and step-pool stream types; typically in more confined valleys, do not supply appreciable quantities of sediments to downstream reaches on an annual basis; little or no mass wasting; storage of fine sediment is negligible due to high transport capacity derived from both the high gradient and/natural entrenchment of the channel. |
| **Confined Source and Transport** | Cobble step pool and steep plane bed streams; confining valley walls, comprised of erodible tills, glacial lacustrine, glacial fluvial, or alluvial materials; mass wasting and landslides common and may be triggered by valley rejuvenation processes; storage of coarse or fine sediment is limited due to high transport capacity derived from both the gradient and entrenchment of the channel. Look for streams in narrow valleys where dams, culverts, encroachment (roads, houses, etc.), and subsequent channel management may trigger incision, rejuvenation, and mass wasting processes. |
| **Unconfined Source and Transport** | Sand, gravel, or cobble plane bed streams; at least one side of the channel is unconfined by valley walls; may represent a stream type departure due to entrenchment or incision and associated bed form changes; these streams are not a significant sediment supply due to boundary resistance such as bank armoring, but may begin to experience erosion and erosion and supply both coarse and fine sediment when bank failure lead to channel widening; storage of coarse or fine sediment is negligible due to high transport capacity derived from the deep incision and little or no floodplain access. Look for straightened, incised or entrenched streams in unconfined valleys, which may have been bermed and extensively armored and are in Stage II or early Stage III of channel evolution. |
| **Fine Source and Transport & Coarse Deposition** | Sand, gravel, or cobble streams with variable bed forms; at least one side of the channel is unconfined by valley walls; may represent a stream type departure due to vertical profile and associated bed form changes; these streams supply both coarse and fine sediments due to little or no boundary resistance; storage of fine sediment is lost or severely limited as a result of channel incision and little or no floodplain access; an increase in coarse sediment storage occurs due to a high coarse sediment load coupled with the lower transport capacity that results from a lower gradient and/or channel depth. Look for historically straightened, incised, or entrenched streams in unconfined valleys, having little or no boundary resistance, increased bank erosion, and large unvegetated bars. These streams are typically in late Stage III and Stage IV of channel evolution. |
| **Coarse Equilibrium (in = out) & Fine Deposition** | Sand, gravel, or cobble streams with equilibrium bedforms; at least one side of the channel is unconfined by valley walls; these streams transport and deposit coarse sediment in equilibrium (stream power—produce as a result of channel gradient and hydraulic radius—is balanced by the sediment load, sediment size, and channel boundary resistance); and store a relatively large volume of fine sediment due to the access of high frequency (annual) floods to the floodplain. Look for unconfined streams, which are not incised or entrenched, have boundary resistance (woody buffers), minimal bank erosion, and vegetated bars. These streams are Stage I, late IV, and Stage V. |
| **Deposition** | Silt, sand, gravel, or cobble streams with variable and braided bed forms; at least one side of the channel is unconfined by valley walls; may represent a stream type departure due to changes in slope and/or depth resulting in the predominance of transient depositional features; storage of fine and coarse sediment frequently exceeds transport**. Floodplains are accessed during high frequency (annual) floods. Look for unconfined streams, which are not incised or entrenched, have become significantly over-widened, and if high rates of bank erosion are present, it is offset by the vertical growth of unvegetated bars. These regimes may be located at zones of naturally high deposition (e.g., active alluvial fans, deltas, or upstream of bedrock controls), or may exist due to impoundment and other backwater conditions above weirs dams and other constrictions. |

** Use of the "Deposition" regime characterization may be rare, but valuable as a planning tool, where the reach is storing far more than it is transporting during some defined planning period. The extreme example would be that of an impounded reach where all of the coarse and a great percentage of the fine sediments are being deposited, rather than transported downstream. This man-made condition may change, thereby changing the sediment regime, but is not likely over the period at which the corridor plan will be used.

### *3.3.3 SENSITIVITY ANALYSIS*

The following description of the sensitivity of various stream types to changes in sediment and flow regimes, boundary conditions and channel morphology, is included from the most recent version of the VTANR River Corridor Planning Guide (VTANR, 2010).

> Certain geomorphic stream types are inherently more sensitive than others, responding readily through lateral and/or vertical adjustments to high flow events and/or influxes of sediment. Other geomorphic stream types may undergo far less adjustment in response to the same watershed inputs. In general, streams receiving a large supply of sediment, having a limited capacity to transport that sediment, and flowing through finer-grained, non-cohesive materials are inherently more sensitive to adjustment and likely to experience channel evolution processes than streams with a lower sediment supply, higher transport capacity and flowing through cohesive or coarse-grained materials (Montgomery and Buffington, 1997). The geometry and roughness of the stream channel and floodplain (i.e., the width, depth, slope, sediment sizes, and floodplain relations) dictate the velocity of flow, how much erosive power is produced, and whether the stream has the competence to transport the sediment delivered from upstream (Leopold, 1994). If the energy produced by the depth and slope of the water is either too little or too great in relation to the sediment available for transport, the stream may be out of equilibrium and channel adjustments are likely to occur, especially during flood conditions (Lane, 1955).

Stream sensitivity maps have been prepared for the Malletts Creek and Allen Brook study area. Sensitivity ratings were assigned using the VTDEC Protocols (VTDEC, 2009).

## 3.4 PROJECT IDENTIFICATION

Site-specific projects were identified using methods outlined by VTANR in Chapter 6 Preliminary Project Identification and Prioritization (VTANR, 2010). This planning guide is intended to aid in the development of projects that protect and restore river equilibrium conditions. The projects identified for the study reaches can be classified under one of the following categories: Active Geomorphic Restoration, Passive Geomorphic Restoration, and Conservation.

- **Active Geomorphic Restoration** implies the management of rivers to a state of geomorphic equilibrium through active, physical alteration of the channel and/or floodplain. Often this approach involves the removal of human constructed constraints or the construction of meanders, floodplains or stable banks. Riparian buffer re-vegetation and long-term protection of a river corridor is essential to this alternative.

- **Passive Geomorphic Restoration** allows rivers to return to a state of geomorphic equilibrium by removing factors adversely impacting the river and subsequently using the river's own energy and watershed inputs to re-establish its meanders, floodplains and equilibrium conditions. In many cases, passive restoration projects may require varying degrees of active measures to achieve ideal results. Riparian buffer re-vegetation and long-term protection of a river corridor (e.g., corridor easements) is essential to this alternative.

- **Conservation** is an option to consider when stream conditions are generally "good" or "reference" and the channel is in a state of dynamic equilibrium. Typically, conservation is applied to minimally disturbed reaches where river structure and function and vegetation associations are relatively intact, and/or where high quality aquatic habitat is found.

### 3.5 Quality Assurance/Quality Control

The RMP Quality Assurance (QA) protocols outlined in the SGA protocols (VTANR, 2007) were followed in order to ensure a complete and accurate dataset. RMP staff shared responsibility with FEA for the QA of the finalized Phase 1 and 2 datasets. All metadata describing the data sources were entered in the Data Management System (DMS), with extraordinary sources noted in the comments section in Step 7. The Phase 1 and Phase 2 QA reviews were completed by RMP staff following the completion of the dataset. A written record of QA issues raised by RMP, and responses from FEA is included in Appendix D.

## 4.0 Phase 1 Results

### 4.1 Reach Delineations

The 61.7 miles of primary surface water within the Malletts Creek and Allen Brook watershed were divided into 95 reaches during the reach delineation process. Reach divisions were based on changes in valley geometry, channel slope, and the size and influence of tributaries entering the main stem channel (VTANR, 2007). Of the 95 total reaches, 51 were selected to receive full Phase 1 assessments on a total of 25.2 stream miles. Seven (7) major tributaries (e.g., drainage area exceeds 10% of main stem drainage area at confluence) were identified during the delineation analysis (Figure 4.1). Full SGAT analysis was conducted on the main stem of Malletts Creek, Allen (Petty) Brook and several sub-tributaries. Table 4.1 summarizes data for the main stem and tributaries assessed. Detailed information about each reach location is found in the reach reports in Appendix A.

### 4.2 Reference Stream Types

Remotely collected data of valley confinement, channel slope, and sinuosity were used to develop reference stream types for the assessed reaches according to the Rosgen (1994) and Montgomery and Buffington (1997) classification systems. Characterization of reference stream types is based on the channel forms and processes expected in a particular geologic and geomorphic setting without human influences. Detailed information about each reach and their reference stream type is found in the reach reports in Appendix A. Table 4.2 presents general valley and channel characteristics associated with reference stream types found in the Malletts Creek and Allen Brook watershed.

**Table 4.1** Reference stream type characteristics

| Stream Type | Valley Confinement | Channel Slope | Sinuosity | Bedform | Number of Study Reaches* |
|---|---|---|---|---|---|
| A | Confined | > 4% | Low | Cascade or Step-pool | 5 (10%) |
| B | Confined | 2 – 4% | Low | Step-pool or Plane bed | 6 (12%) |
| C | Unconfined | < 2% | Moderate | Riffle Pool | 14 (27%) |
| E | Unconfined | < 2% | High | Riffle Pool or Dune-Ripple | 26 (51%) |

* Number of reaches and percentage of total reaches represented by type

Figure 4.1 presents the location of the reference stream types developed for the Malletts Creek and Allen Brook watershed. A majority of the reaches (51%) in the watershed are E-type under reference conditions. This stream type is characterized by channels with high sinuosity found in a broad or very broad valley setting. A low degree of slope (<2%) is usually observed with this stream type, making the dominant geomorphic processes as coarse equilibrium and fine deposition. Thirty-five percent (27%) of the reaches in the watershed are C-type under reference conditions. This stream type is typically characterized by a moderately sinuous channel found in a broad, unconfined valley setting with a balance between the upslope sediment supply and the transport capacity. The other 22% of the watershed is mostly A-type and B-type channels. In these reaches the confined valley settings and higher slopes have more of a transport-based sediment regime and either step-pool or cascade bedform.

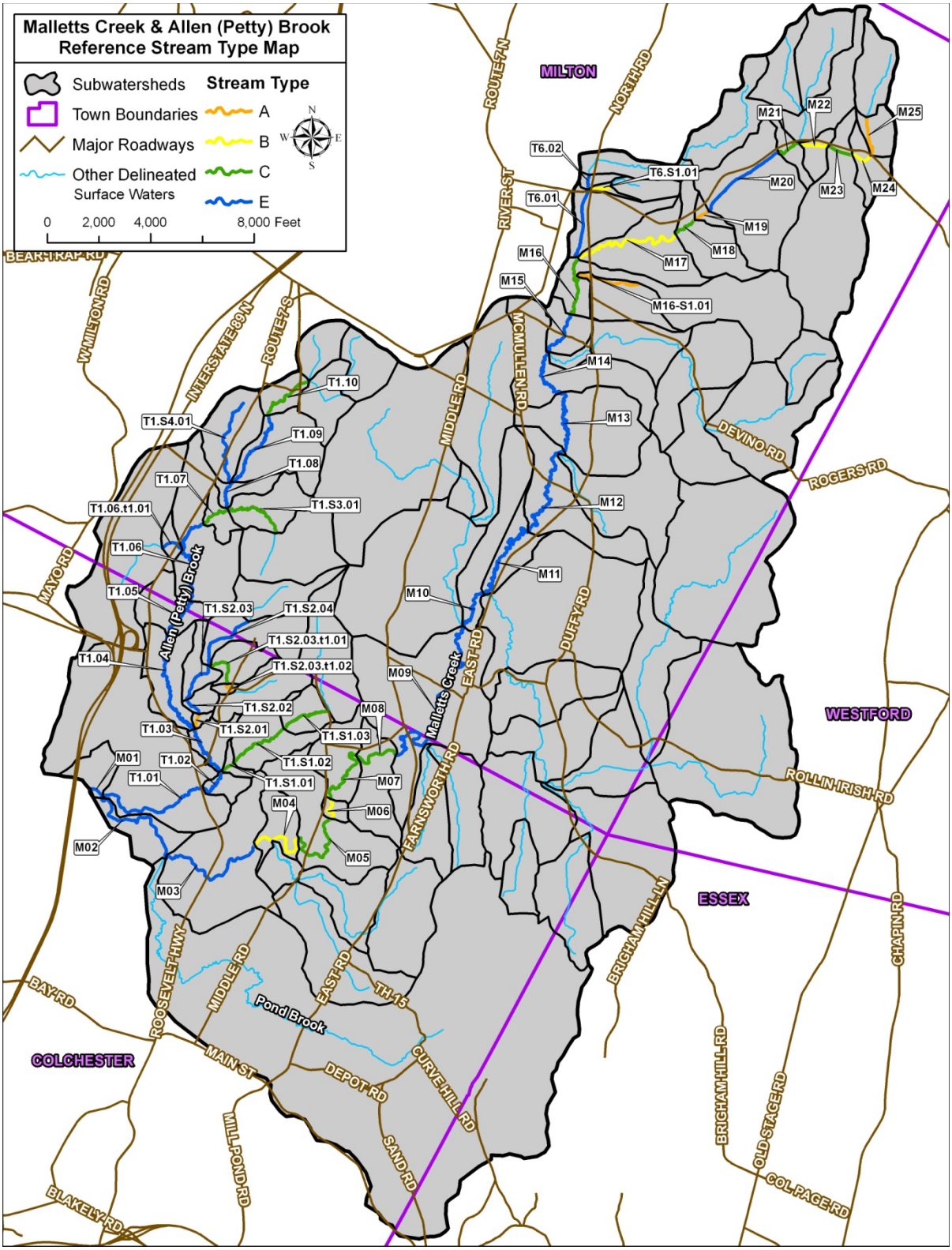



**Figure 4.1** Reference stream type map for the Malletts Creek and Allen (Petty) Brook watershed

## 4.3 Watershed Geology and Soils

The NRCS soils data (NRCS, 2008) was utilized to review the parent material of the watershed. Figure 4.4 depicts the main classes of parent materials distributed across the watershed. Only a few grade controls were observed in the field during the windshield survey. In other areas grade controls were discerned using the LiDAR derived 2-foot contours where channel slopes exceeded 25% (VCGI, 2009). One very large bedrock cascade section was noted in reach M19 along Westford Road (Figure 4.2). The presence of numerous other grade controls in the headwaters reaches is likely where bedrock outcroppings are present. Detailed geologic information about each reach is found in the reach reports found in Appendix A.

**Figure 4.2** Bedrock cascade in reach M19

The 2004 2-ft LiDAR obtained from VCGI contour data was also effective in showing areas of glacial terraces (2009). The steep valleys that have cut down, like fingers, through the Glacial Lake Vermont sediment's dense hydric soil can be seen easily using the LiDAR data (Figure 4.3). No further research was done to determine the time frame at which these valleys have shaped since the last glaciation. The parent material in the watershed was mostly lacustrine material from the presence of Glacial Lake Vermont and outwash from the Lamoille River Delta during the Champlain Sea era. Glacial tills make up a large portion of the highlands on the east side of the watershed (Figure 4.4). The soils in the watershed are mostly hydric comprised of poorly drained clays and clay-loams (hydrologic soil group D; Figure 4.5). These dense soils were deposited during the time of Lake Vermont and Champlain Sea post glaciations.


**Figure 4.3** Dendritic valley scars and terraces on tributaries to M13 and M14

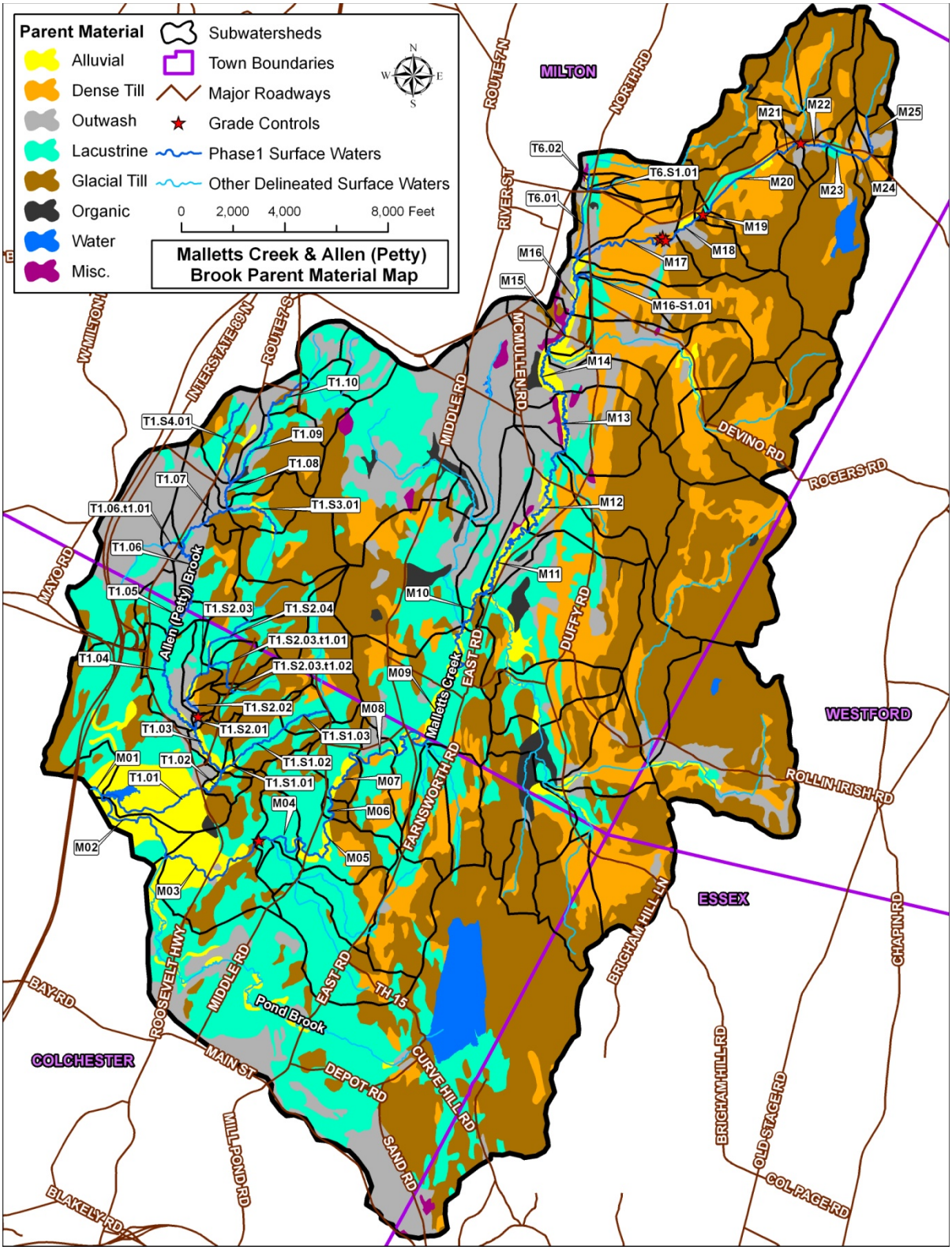



**Figure 4.4** Parent surficial material map Malletts Creek and Allen (Petty) Brook watershed

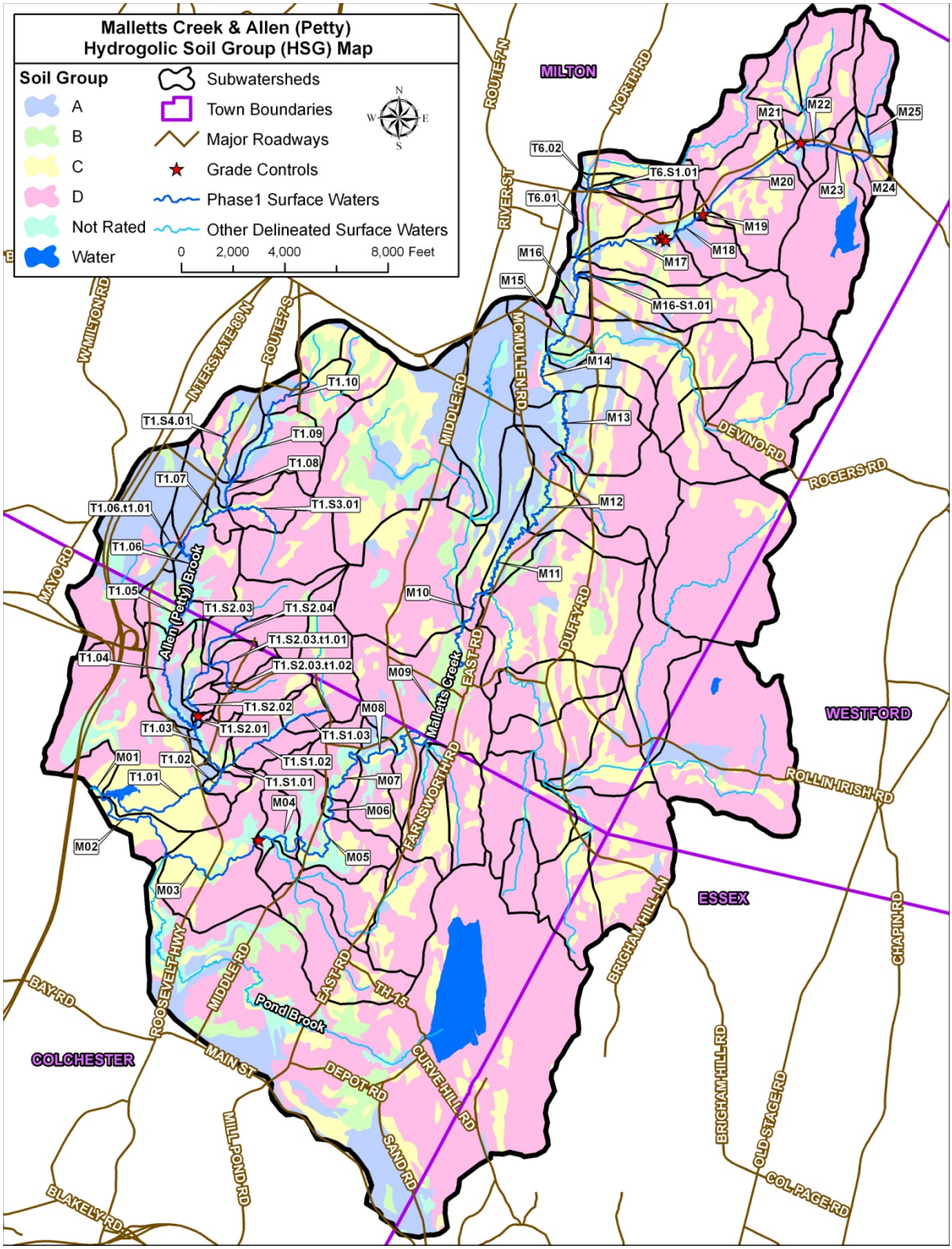



**Figure 4.5** Hydrologic soil group map Malletts Creek and Allen (Petty) Brook watershed

## 4.4 Land Cover and Reach Hydrology

Step 4 of the Phase 1 protocols evaluates the impacts of watershed land use, riparian vegetative cover, and other reach-scale controls on hydrologic processes. Conversion of natural forest cover to urban and agricultural land uses in a watershed, even at low levels (e.g., 10% of watershed area), has been shown to have measurable deleterious effects on channel stability and aquatic biota (Paul and Meyer, 2001; CWP, 2003). Loss of forest cover reduces the infiltration capacity of soils, and typically results in increased runoff during infrequent storm events and reduced base flow during the dry periods of the year. In addition, direct impacts to riparian cover along the river bank and within the corridor are also known to have negative impacts on channel stability (e.g., loss of boundary resistance) and available habitat for biota (e.g., canopy shading, large woody debris, etc.). Other local-scale influences on reach hydrology include adjacent wetlands, small tributaries, and other sources of groundwater inputs. These features provide important inputs of cooler waters that are critical for microhabitats, especially during the late summer and fall months when water temperatures can become elevated to levels that are harmful to native stenotherms (e.g., trout).

Land cover in the Malletts Creek and Allen Brook watershed was summarized with the SGAT tool using data derived from 2002 LANDSAT satellite imagery (VCGI, 2003). This dataset was clipped to the local watershed (e.g., area draining directly to reach) and stream corridor to understand the impacts to each reach at each scale. Impact ratings were automatically generated upon upload of the data to the DMS based on the rankings provided in Table 4.2. In addition to the DMS summarized data, more recent land cover data was summarized at the watershed scale, as previously reviewed in Table 2.1 in Section 2.1.

**Table 4.2** SGA land use impact ratings

| Impact Rating | Land Cover Value |
|---|---|
| High | 10% or more of reach watershed is crop and/or urban |
| Low | Between 2 - 10% of reach watershed is crop and/or urban |
| Not Significant | Less than 2% of reach watershed is crop and/or urban |

Historic land cover data for the reach watershed and corridor scales was reviewed using a series of aerial photographs of the study area from 1937 and 1962 available through the University of Vermont Bailey/Howe Library. The images were georectified and overlain on the subwatershed mapping to understand land use changes over the last 40 years. In short, the watershed was a mixture between agriculture and forest lands in the 1960's, however the forest stands were likely much younger and homogenous and the agriculture made up a much larger component of the total land area. Even more agricultural lands were present in the 1937 photos. The current dominant land cover type for the entire watershed is forest, because much of the suboptimal farmland was abandoned.

Analysis of multiple vintages of aerial photographs aids in understanding the extent of watershed development that has occurred, and the degree to which the land use changes may have influenced the

channel morphology. The watershed has seen some urbanization since the 1960's. Much of the Malletts Creek watershed has lost significant amounts of agricultural land that has been replaced by low density residential developments and a few areas of higher density residential (Figure 4.6). Petty Brook also has had some recent urbanization and industrialization in the upper watershed between Route 7 and Interstate 89. A large industrial park occupies reach T1.06.t1.01 and T1.06.t1.02 (Figure 4.7). This park has greatly impacted the hydrology and a large stormwater detention basin is situated just upstream of the confluence point with T1.06. The land use in the watershed currently is variable, however, most reaches scored "high" because of urban impacts of roads or from crop impacts at both the watershed and corridor scale. A complete summary of land use impact scores from the SGAT derived 2002 LandSAT data can be found in Appendix A.

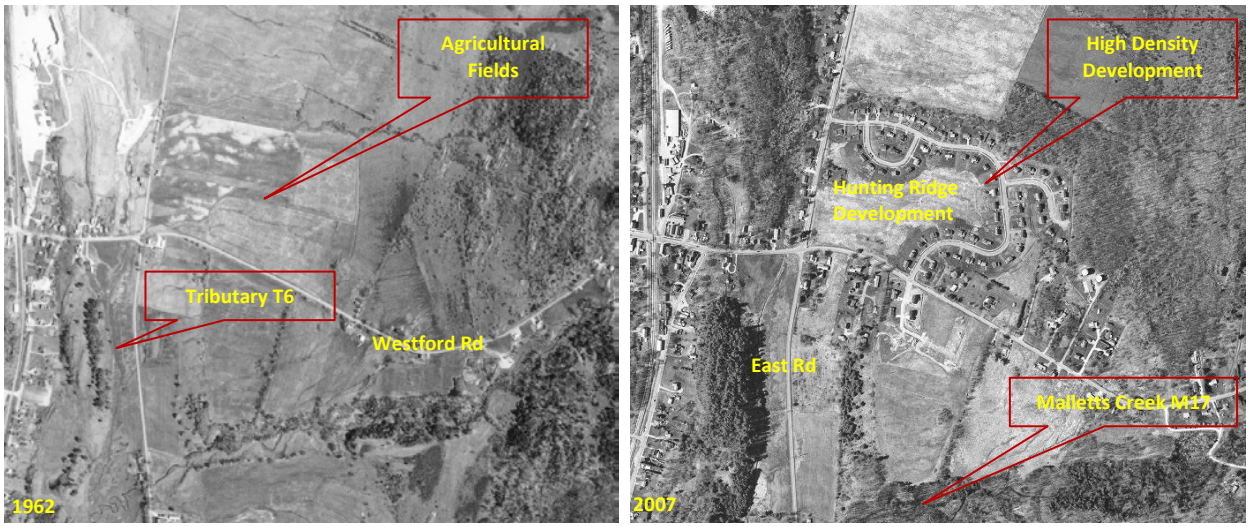



**Figure 4.6** Change in land use from 1962 to 2007 in upper Malletts Creek watershed

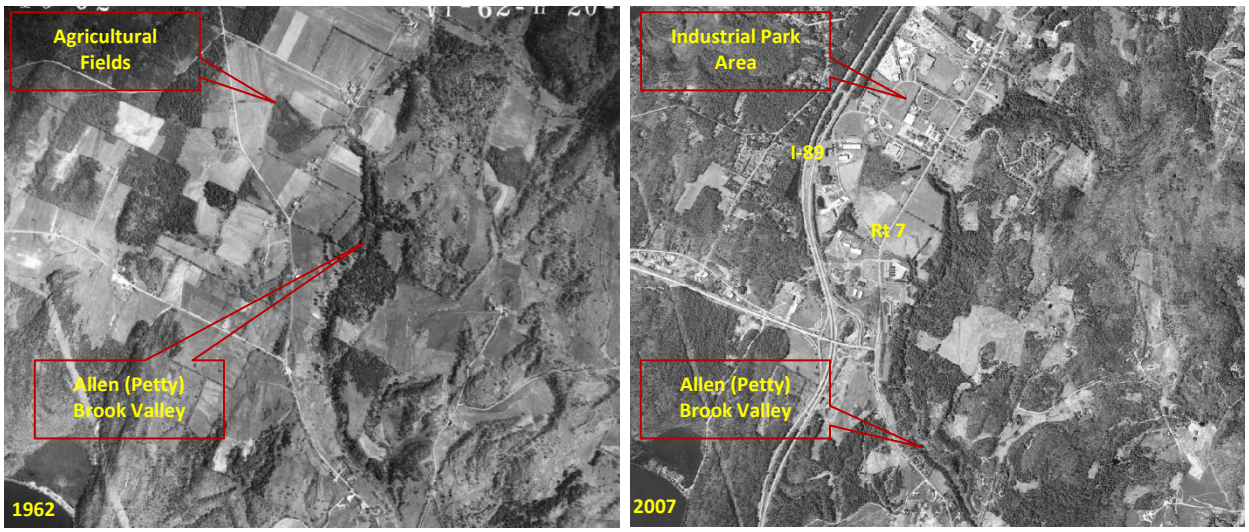



**Figure 4.7** Change in land use from 1962 to 2007 in Allen (Petty) Brook upper watershed

Riparian buffer widths were estimated remotely and verified in the field where possible during the windshield surveys. Areas where the buffer widths were less than 25 feet were mapped remotely and indexed using the FIT. Areas that received high impact scores for the lack of a healthy riparian buffer were those valleys where adjacent lands have been intensively used for agricultural or residential land uses including the presence of roadways (Figure 4.8). Adequate buffer widths are very important to habitat function and in preventing thermal loading to the surface water. A complete summary of land use impact scores from buffers less than 25 feet can be found in Appendix A.

**Figure 4.8** A buffer width of less than 25 feet along the right (west) bank of reach M07

Groundwater and small tributary inputs were reviewed for each reach using the National Wetlands Inventory (NWI, 2004) and the Vermont Hydrography Dataset. The very large wetland complex between Lake Champlain and the Route 7 crossings of Petty Brook and Malletts creek covers over 350 acres (Figure 4.9). This contiguous wetland and others like it in the watershed offer recharge to the ground water and consistent flow during the dry months. Additional detailed information about each Step 4 parameter for all reaches is found in the watershed summary data and reach reports found in Appendix A.

**Figure 4.9** Looking West (left) and East (right) from the crossing of T1.01 into the large wetland area east of Lake Champlain

## 4.5 In stream Channel Modifications

Data collected as part of SGA Step 5 aids in the understanding of how direct impacts to the channel boundaries have altered the sediment supply and transport regimes at the reach scale. Flow-regulating structures that span the channel impact the natural flow variability in downstream reaches, and interrupt the sediment supply along the channel network. These features often result in reduced in stream habitat as well as channel incision in downstream areas where the sediment transport capacity exceeds the limited supply from upslope. Bridges and culverts that are inadequately sized to accommodate channel forming flows have similar impacts to habitat and sediment transport as flow-regulating structures. In addition, culverts that have severely "perched" outlets create a discontinuity in habitat along the channel by preventing fish passage. Bank armoring, channel straightening, and dredging are human impacts that increase the sediment transport capacity of the channel through the increased resistance to lateral migration and channel slope. Further discussion of the impacts of in stream channel modifications is provided in the SGA Phase 1 Handbook (VTANR, 2007b). Reaches with significant impacts from these features are summarized below. Additional detailed information about each Step 4 parameter for all reaches is found in the watershed summary data and reach reports found in Appendix A.

*Impoundments and Flow Regulations*

Flow regulations have been reviewed and mapped using the VTANR Dam Inventory (VTANR, 2005), as well as further field observations. These features are summarized below for the main stem and tributary reaches. Each of the flow regulations indexed with the FIT is considered a run-of-the-river feature (e.g., no current water withdrawals).

Using aerial imagery, a total of two (2) impoundments were observed in the basin. All three of these features were considered large run-of-the-river because the width of the impounded area was larger than that of the channel. The only flow regulation feature located on the main stem is found in the headwaters reach M24 where the channel has been backed up to create a pond near a residence. The other impoundment is a large detention pond on T1.06.t1.01 this detention pond receives all of the surface water from the industrial park found west of Route 7. Other impoundments were observed in aerial imagery, but these features were outside of the Phase 1 study area and not indexed.

*Bridges and Culverts*

The locations and lengths of bridge and culvert crossings were mapped remotely and were verified in the field where possible. A total of 40 structures were noted on the 51 assessed reaches: 9 bridges, 27 culverts, and 4 unknown structures were observed. Culverts and bridges act as a constriction point to the channel at various flow depths, or inhibit the passage of wildlife if the culvert is improperly constructed. The McMullen Road crossing of M12 has a beaver dam immediately upstream this debris blockage impedes flows and might create problems for the structure in the future (Figure 4.10).

**Figure 4.10** Looking upstream at the beaver dam impeding the inlet of the McMullen Rd culvert in reach M12

*Bank Armoring*

Bank armoring and revetments were noted in as much detail as possible during the windshield surveys. Three reaches had significant amounts of bank armoring that was observed during the windshield survey. All of the rip-rap observed was in short lengths around bridges or culverts to protect them from bank erosion occurring during high flows.

*Channel Straightening and Dredging*

Multiple data sources were utilized to identify areas of channel straightening, including: 1) historic aerial photographs from 1962 and 1937, 2) high resolution, 3-band color imagery from 2004, 3) black and white orthographic photos from 2007, and 4) NAIP imagery from 2008 and 2009. In addition, field observations were made to verify areas of inferred channel straightening from available mapping. Tributary 6 was extensively straightened along East Road even though the valley is wide (Figure 4.11). No data regarding dredging could be obtained from state officials, but a complete record of straightening impacts can be found in Table 4.3.

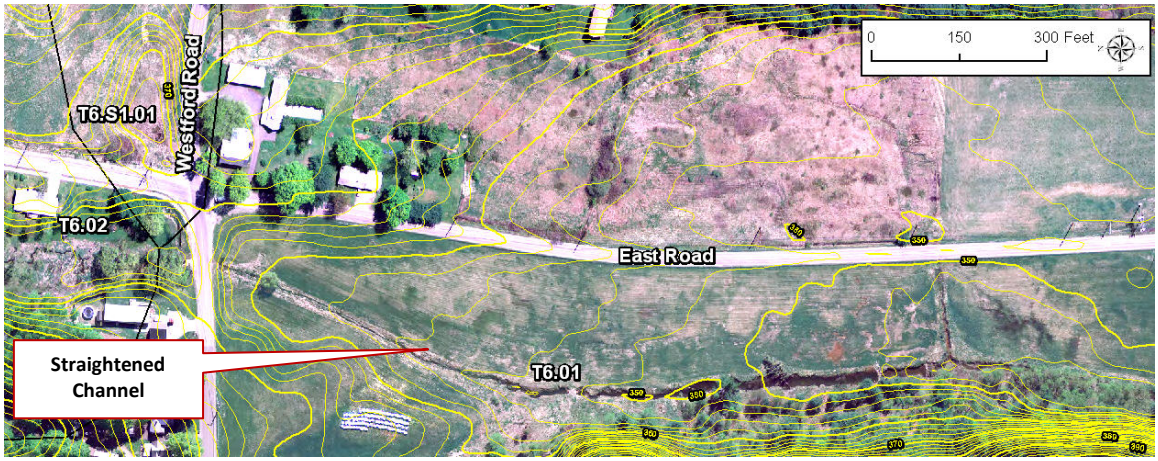



**Figure 4.11** Straightening impacts in tributary T6.01 along East Road

**Table 4.3** Summary of channel straightening impacts on Malletts Creek and Allen (Petty) Brook

| Reach ID | Impact Length (ft) | Percent (%) | Impact Type | Reach ID | Impact Length (ft) | Percent (%) | Impact Type |
|---|---|---|---|---|---|---|---|
| M02 | 864 | 18.1% | Low | T1.03 | 607 | 22.4% | High |
| M03 | 502 | 10.0% | Low | T1.04 | 1,154 | 21.4% | High |
| M05 | 565 | 15.7% | Low | T1.06 | 594 | 13.0% | High |
| M07 | 1,335 | 43.3% | High | T1.06.t1.01 | 727 | 73.4% | High |
| M10 | 1,022 | 43.9% | High | T1.09 | 149 | 3.7% | Not Sig. |
| M14 | 408 | 14.7% | Low | T1.10 | 684 | 27.7% | High |
| M15 | 2,016 | 93.4% | High | T1.S1.03 | 499 | 23.1% | High |
| M16-S1.01 | 2,522 | 98.2% | High | T1.S2.03 | 284 | 15.2% | High |
| M17 | 733 | 14.3% | Low | T1.S2.04 | 2,772 | 100.0% | High |
| M20 | 3,654 | 98.5% | High | T1.S3.01 | 48 | 1.6% | Not Sig. |
| M23 | 1,005 | 99.4% | High | T1.S4.01 | 2,372 | 63.8% | High |
| M24 | 116 | 12.3% | Low | T6.01 | 2,537 | 88.8% | High |
| T1.01 | 250 | 5.0% | Low | T6.02 | 609 | 100.0% | High |
| T1.02 | 945 | 58.9% | High | T6.S1.01 | 876 | 97.9% | High |

## 4.6 Floodplain Modifications and Planform Changes

Due to the historical development of road networks and settlement patterns in the lowland areas of Vermont, many alluvial rivers and their floodplains have been encroached upon by roads and development over the years. As discussed in the previous section, many of these areas have also been historically manipulated and straightened to maintain an unnaturally steep slope in a state of sediment transport, allowing for a short-term sense of security from flooding and subsequent encroachment of infrastructure in the floodplain. In addition to historic alterations to channel slope in Vermont's alluvial rivers, the lowering of stream beds (e.g., dredging) and the raising of floodplains (e.g., berming) has resulted in an increase in channel depth (VTANR, 20010). Channel depths have typically been increased through the encroachment on the floodplain by roads, development and railroads and subsequent filling and armoring required to construct and to maintain this infrastructure. Increases in impervious cover have also led to the deepening and eventual widening of channels throughout urbanized areas of Vermont (Fitzgerald, 2007).

These human impacts tend to induce a series of channel adjustments that begin with channel incision, leading to widening and eventually a redevelopment of a sinuous planform in alluvial reaches. Reaches with significant impacts associated with the above-described human impacts are summarized below according to the SGA impact ratings listed in Table 4.4. Additional detailed information about each Step 5 parameter for all reaches is found in the reach reports in Appendix A.

**Table 4.4** Impact ratings for corridor encroachments and development

| Impact Rating | Impact Criteria |
|---|---|
| High | Greater than 20% of reach length affected. |
| Low | Between 5 - 20% of reach length affected. |
| Not Significant | Less than 5% of reach length affected. |

*Encroachments*

Following the Phase 1 protocol, any berms, roads, driveways, railroads and/or improved paths found within the stream corridor were indexed using the FIT. These areas were identified using the high resolution, 3-band color imagery from 2004 and were confirmed and/or refined during the field observations. Figure 4.12 depicts Reach M10 where railroad encroachment has significantly impacted the stream corridor, cutting off a once accessible floodplain. Impact ratings for step 6.1 based on the percentage of the reach length that was impacted as indicated in Table 4.2. A complete record of the corridor encroachments within the watershed is available in Table 4.5, however further Phase 2 assessments may reveal additional berm encroachments that were not observed remotely or during the windshield surveys.

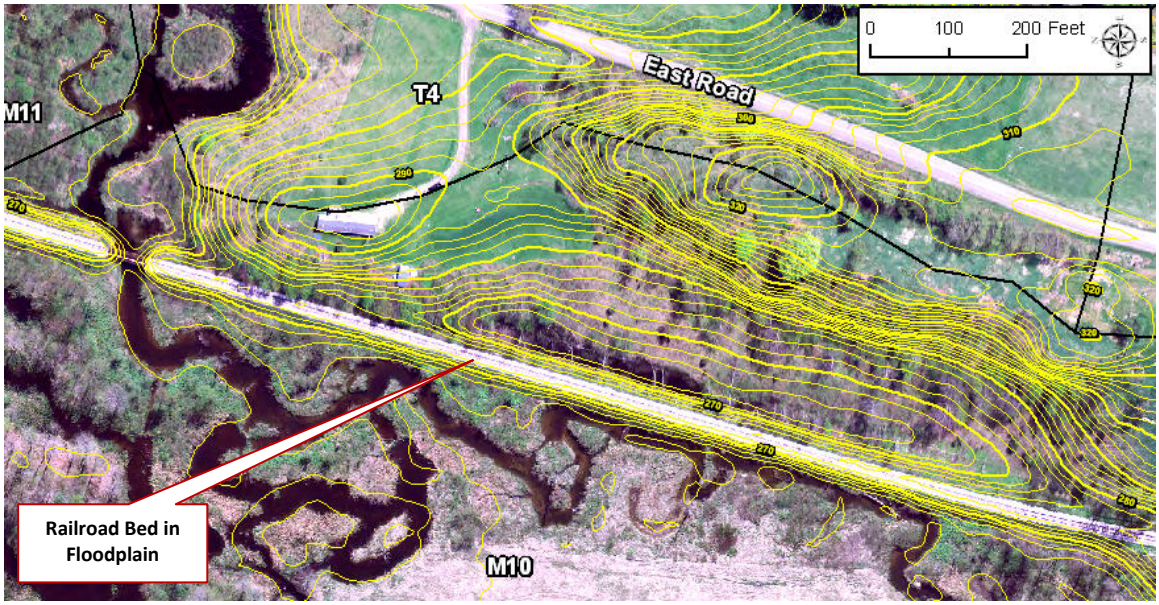



**Figure 4.12** Railroad encroachment impacts on reach M10 west of East Road

**Table 4.5** Summary of corridor encroachment impacts

| Reach ID | Height (ft) | Impact Length (ft) | Percent (%) | Impact Type |
|---|---|---|---|---|
| M09 | 15.0 | 1,837 | 19% | Low |
| M10 | 12.0 | 1,902 | 82% | High |
| M11 | 5.0 | 929 | 16% | Low |
| M12 | 5.5 | 386 | 71% | High |
| M17 | 8.0 | 110 | 21% | High |
| M22 | 10.0 | 152 | 12% | Low |
| M23 | 10.0 | 24 | 2% | Not Sig. |
| M25 | 4.0 | 138 | 9% | Low |
| T1.06 | 13.1 | 1,042 | 23% | High |
| T1.S4.01 | 6.0 | 1,051 | 28% | High |
| T6.S1.01 | 6.0 | 367 | 41% | High |

*Development*

The impact of development within the stream corridor was evaluated using high resolution, 3-band color imagery from 2004, black and white orthographic photos from 2007, NAIP imagery from 2009, and refined during the field observations. The presence of development was indexed using the FIT, and impact ratings for each reach were developed based on SGA criteria presented in Table 4.2. The majority of the development observed on the main stem was on mid and upper reaches (Table 4.6). Some development is noted on Allen Brook, but the rest of the watershed is well buffered with little corridor encroachment by houses.

**Table 4.6** Summary of corridor development impacts

| Reach ID | Impact Length (ft) | Percent (%) | Impact Type | Reach ID | Impact Length (ft) | Percent (%) | Impact Type |
|---|---|---|---|---|---|---|---|
| M09 | 1,073 | 11.2% | Low | M24 | 77 | 8.2% | Low |
| M16-S1.01 | 459 | 17.9% | Low | M25 | 214 | 13.5% | Low |
| M17 | 215 | 4.2% | Not Sig. | T1.06 | 350 | 7.7% | Low |
| M20 | 101 | 2.7% | Not Sig. | T1.10 | 149 | 6.0% | Low |
| M21 | 165 | 15.7% | Low | T1.S4.01 | 357 | 9.6% | Low |
| M22 | 291 | 22.4% | High | T6.02 | 577 | 94.7% | High |

*Depositional Features*

Sediment depositional features (e.g., point bars, mid channel bars, etc.) were evaluated using the 2004 high resolution, 3-band color imagery and were confirmed and/or refined during the field observations. Reaches with multiple types of depositional features indicated where upslope sediment supply exceeded the transport capacity. These areas represent conditions that are favorable for increased lateral channel migration that could endanger adjacent infrastructure and properties. For most of the watershed it was difficult to access the stream channel remotely (due to the channel's small size), or to get a clear sense of the depositional processes at the access points during the windshield surveys. Given the relatively small size of the watershed, and forest cover over much of the corridor area, only about one-half of the reaches were assessed for depositional features. Despite the drawbacks in reach

accessibility, several reaches were deemed to have a “low” impact from depositional material and one reach had a “high” impact rating. This reach, M05, had an abundance of sediment on the point bars upstream and downstream of the Juniper Hill Road crossing. Here, the upslope sediment supply greatly exceeds the transport capacity of the channel (Figure 4.13). Additional detailed data about the types of depositional features and their relative impacts for all reaches are found in the reach reports found in Appendix A.

**Figure 4.13** Large point bar upstream of Middle Rd crossing of reach M05

*Meander Migration*

Recent and historic aerial photographs and imagery were reviewed to identify areas of channel migration, bifurcation, and avulsions on the Malletts Creek and Allen Brook watershed. Historical photographs from 1962 and 1937 were reviewed. For areas where significant channel migration was noted, the historical imagery was georectified using ArcGIS software to transform the mapping into the NAD 1983 State Plane Meter projections. Previous channel locations (1962) were compared with the current centerlines digitized from the high resolution aerial photographs taken in 2004 for the watershed. The confluence of M17 with T6.01 showed a dramatic change in planform with extensive meander migration and channel straightening in M17 (Figure 4.14). The straightening in the sinuous portion of M17 led to a channel avulsion at the confluence and now the historic channel to the west only receives small volumes of flow and the new channel is the primary thread.

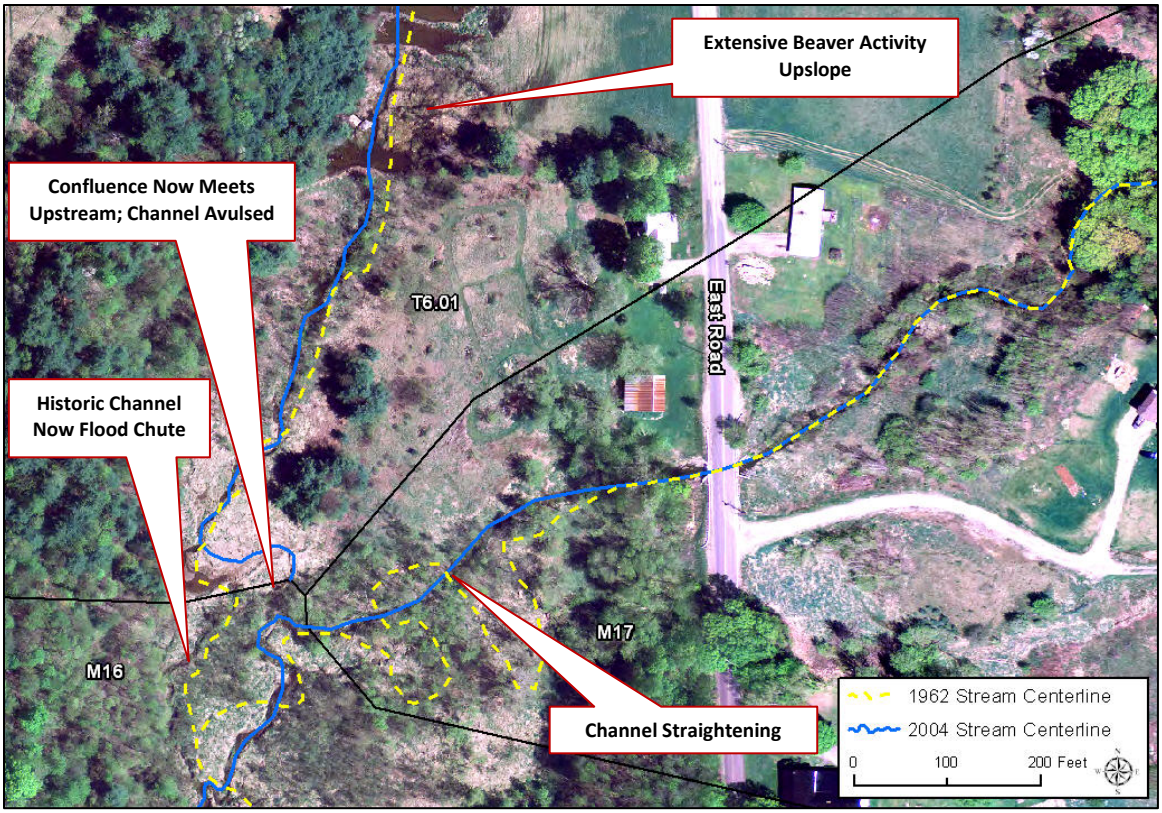



**Figure 4.14** Channel straightening and migration at T6 and M17 confluence

*Meander Geometry*

For reaches characterized within unconfined valley settings (C or E-type channels), meander geometry was reviewed following the Phase 1 protocols. Shapefiles were developed to indicate the areas where meander width and wavelength was measured. In some cases, multiple meanders were measured and an average of the measurements was entered in the DMS. Where the meander wavelengths and widths fell outside of the range of expected values relative to the predicted channel width, impact ratings of high or low were assigned according to the degree of departure (VTANR, 2007). Most reaches that have E-type morphology have a narrower channel width then predicted by the hydraulic geometry curve, which is common for these types of channels. The meander geometry is calculated using the hydraulic geometry curve data, which would slightly reduce the scores for all E-type reaches. The meanders in the watershed are most often well developed, but have a high frequency and narrower than expected beltwidth. This, in combination with the higher predicted channel widths have yielded low and high impacts for most reaches assessed.

## 4.7 Bed and Bank Windshield Surveys

Windshield surveys were completed following the initial classification of stream type and substrate based on remotely sensed data alone. Surveys were completed in mid-July on all reaches accessible by public roads. Thirty (30) of the 51 total reaches in the study area were at least partially accessible by

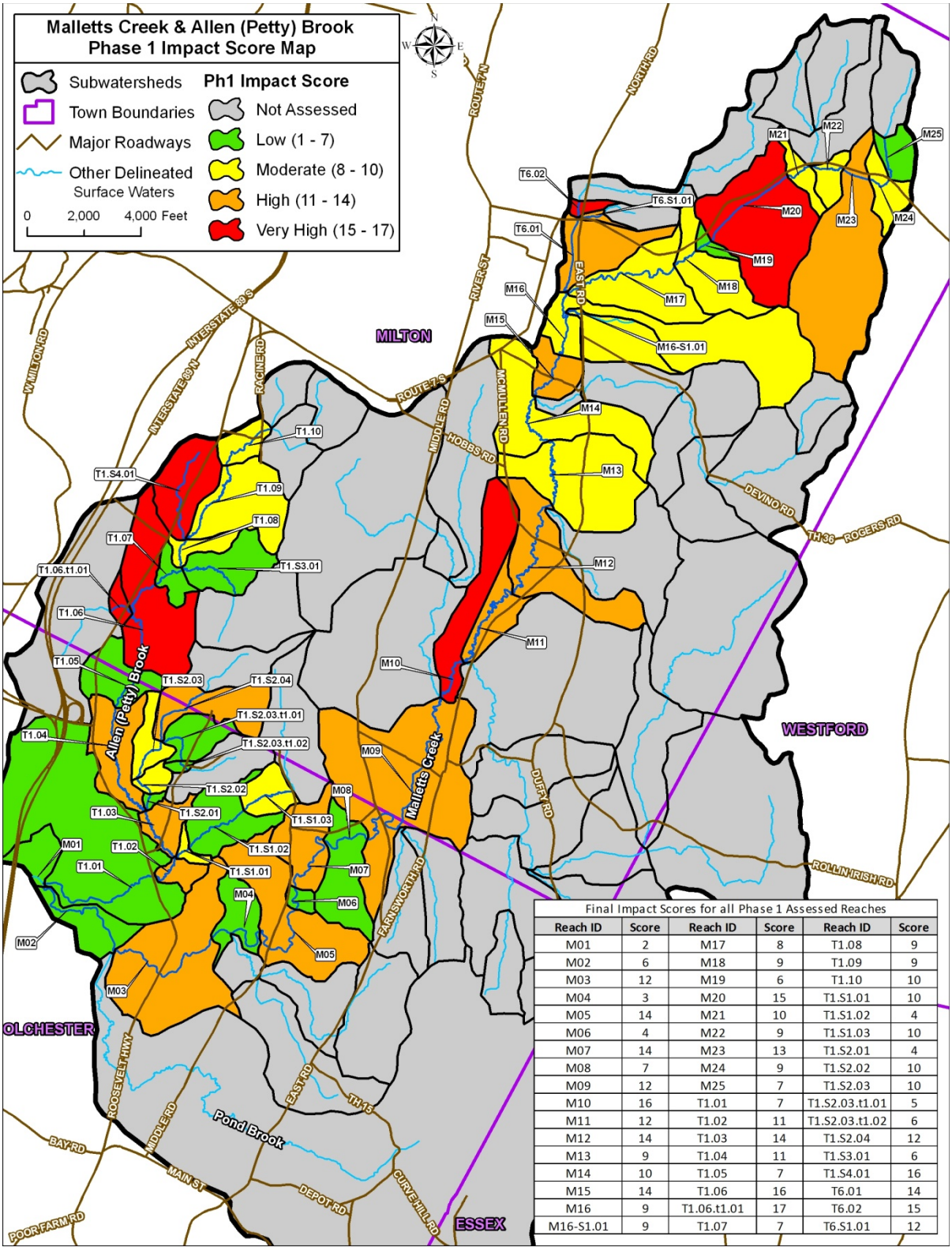
roads and were viewed. The DMS metadata for Step 2 has been revised and indicates whether or not the reach was evaluated in the field. The Phase 1 parameters verified and/or evaluated during the field surveys included:

- General stream and valley geometry, including valley width and confinement, bed substrate, and bedform features (Step 2).
- Grade controls and areas of known or potential alluvial fans (Step 3).
- Impacts on the buffer and stream corridor, including areas of reduced buffer vegetation, road encroachments, and the presence of development within the stream corridor (Steps 4 and 6).
- Types of stream crossing structures (e.g., bridges and culverts), and their potential for causing ice and debris jams (Steps 5 and 7).
- Areas of bank erosion and armoring (Steps 5 and 7).
- Areas of increased sediment deposition and meander migration (Step 6).

Of the parameters listed above, particular attention was paid to recording bank erosion and ice/debris jam potential at the stream crossings. Due to limited direct accessibility on most reaches, bank erosion along the entire channel length was not practical; rather, bank erosion plainly visible along roads or at stream crossings was indexed using the FIT. Therefore the relative length of the reach impacted by bank erosion was likely underestimated compared to typical Phase 2 field observations. Debris and ice jam potential at points of channel constrictions associated with stream crossings and sharp channel bends were recorded in the field. Qualitative ratings of the impact of these areas on sediment and debris continuity were developed and entered into the DMS. A complete summary of impact ratings for bank erosion or ice and debris jam potential for each reach can be found in Appendix A.

### 4.8 DATA ANALYSIS

Impact scores have been generated for each of the Phase 1 steps for the 51 study reaches. In total, 16 individual parameters are evaluated for each study reach (Table 4.7). The Phase 1 dataset in the DMS summarizes each individual parameter using a score range from zero (“not significant”) to 2 (“high”) depending on the degree of impact recorded. The 16 parameters evaluated are summarized for each study reach (Figure 4.15). The scores presented in Figure 4.15 are the total parameter impact scores displayed by quartiles.




Final Impact Scores for all Phase 1 Assessed Reaches

| Reach ID | Score | Reach ID | Score | Reach ID | Score |
|---|---|---|---|---|---|
| M01 | 2 | M17 | 8 | T1.08 | 9 |
| M02 | 6 | M18 | 9 | T1.09 | 9 |
| M03 | 12 | M19 | 6 | T1.10 | 10 |
| M04 | 3 | M20 | 15 | T1.S1.01 | 10 |
| M05 | 14 | M21 | 10 | T1.S1.02 | 4 |
| M06 | 4 | M22 | 9 | T1.S1.03 | 10 |
| M07 | 14 | M23 | 13 | T1.S2.01 | 4 |
| M08 | 7 | M24 | 9 | T1.S2.02 | 10 |
| M09 | 12 | M25 | 7 | T1.S2.03 | 10 |
| M10 | 16 | T1.01 | 7 | T1.S2.03.t1.01 | 5 |
| M11 | 12 | T1.02 | 11 | T1.S2.03.t1.02 | 6 |
| M12 | 14 | T1.03 | 14 | T1.S2.04 | 12 |
| M13 | 9 | T1.04 | 11 | T1.S3.01 | 6 |
| M14 | 10 | T1.05 | 7 | T1.S4.01 | 16 |
| M15 | 14 | T1.06 | 16 | T6.01 | 14 |
| M16 | 9 | T1.06.t1.01 | 17 | T6.02 | 15 |
| M16-S1.01 | 9 | T1.07 | 7 | T6.S1.01 | 12 |

**Figure 4.15** Total impact scores by reach in the Malletts Creek and Allen Brook Watershed

**Table 4.7** Final impact score parameters for phase 1 dataset

| Phase 1 Step | Phase 1 Parameter | Impact Category | Phase 1 Step | Phase 1 Parameter | Impact Category |
|---|---|---|---|---|---|
| 4.1 | Local Watershed Land Cover/Land Use | Land Use | 6.1 | River Corridor Encroachments | Floodplain Modifications and Planform Changes |
| 4.2 | Corridor Watershed Land Cover/Land Use | | 6.2 | River Corridor Development | |
| 4.3 | Riparian Buffer Width | | 6.3 | Depositional Features | |
| 5.1 | Flow Regulations | Channel Modifications | 6.4 | Meander Migration | |
| 5.2 | Bridges and Culverts | | 6.5 | Meander Belt Width Departure | |
| 5.3 | Bank Armoring | | 6.6 | Meander Wavelength Departure | |
| 5.4 | Channel Straightening | | 7.2 | Bank Erosion | Bed and Bank Conditions |
| 5.5 | Dredging and Gravel Mining | | 7.3 | Debris and Ice Jam Potential | |

Based on the Phase 1 impact scores, the DMS also develops predictions for channel adjustment processes (VTANR, 2007b). These predictions are based on the dominant impacts recorded for each reach, and are categorized based on the impacts typically associated with the following four channel adjustment processes: 1) Degradation (e.g., channel incision); 2) Aggradation (e.g., increased sediment deposition); 3) Channel widening (e.g., increased bank erosion); 4) Planform Changes (e.g., irregular meander patterns). Using the channel adjustment process ratings, a provisional geomorphic rating is developed for each reach based on the methods outlined in the SGA Phase 1 protocols (page 76; VTANR, 2007b). Table 4.8 outlines the four possible geomorphic ratings based on the SGA methods. Reach reports in Appendix A summarize the predicted reach adjustment processes, as well as stream sensitivity ratings. Both of these parameters have been used in conjunction with the overall impact scores in developing recommendations for further Phase 2 assessment.

**Table 4.8** SGA reach condition ratings

| SGA Rating | Predicted Conditions and Processes |
|---|---|
| **Reference** | In Equilibrium – no apparent or significant channel, floodplain, or land cover modifications; channel geometry is likely to be in balance with the flow and sediment produced in its watershed. |
| **Good** | In Equilibrium but may be in transition into or out of the range of natural variability – minor erosion or lateral adjustment but adequate floodplain function; any adjustment from historic modifications nearly complete. |
| **Fair** | In Adjustment – moderate loss of floodplain function; or moderate to major planform adjustments that could lead to channel avulsions. |
| **Poor** | In Adjustment and Stream Type Departure - may have changed to a new stream type or central tendency of fluvial processes – significant channel and floodplain modifications may have altered the channel geometry such that the stream is not in balance with the upslope sediment load and/or runoff processes. |

## 4.9 PHASE 2 ASSESSMENT PRIORITIZATION

Using the Phase 1 Impact Ratings as the primary basis for reach selection, a list of high and medium-priority reaches was compiled for further Phase 2 surveys. Figure 4.16 presents the selected reaches by location in the watershed and summarizes the selected reaches based on channel length, preliminary reference stream type, substrate, and bedform.

*High Priority Reaches*

Seventeen (17) reaches are considered high-priority for assessment, including 12 reaches on the main stem of Malletts Creek and five (5) reaches on Allen Brook. The total channel length for the selected reaches is 12.3 miles. Reaches were generally chosen if the total impact scores exceeded 11 or if the reach was located in the lower portion of the watershed (e.g., M06). Reach M17 was considered as a high priority because of extensive channel modification in the lower reach. In 1962 the area downstream of East Road was highly sinuous and now it is completely channelized.

*Moderate Priority Reaches*

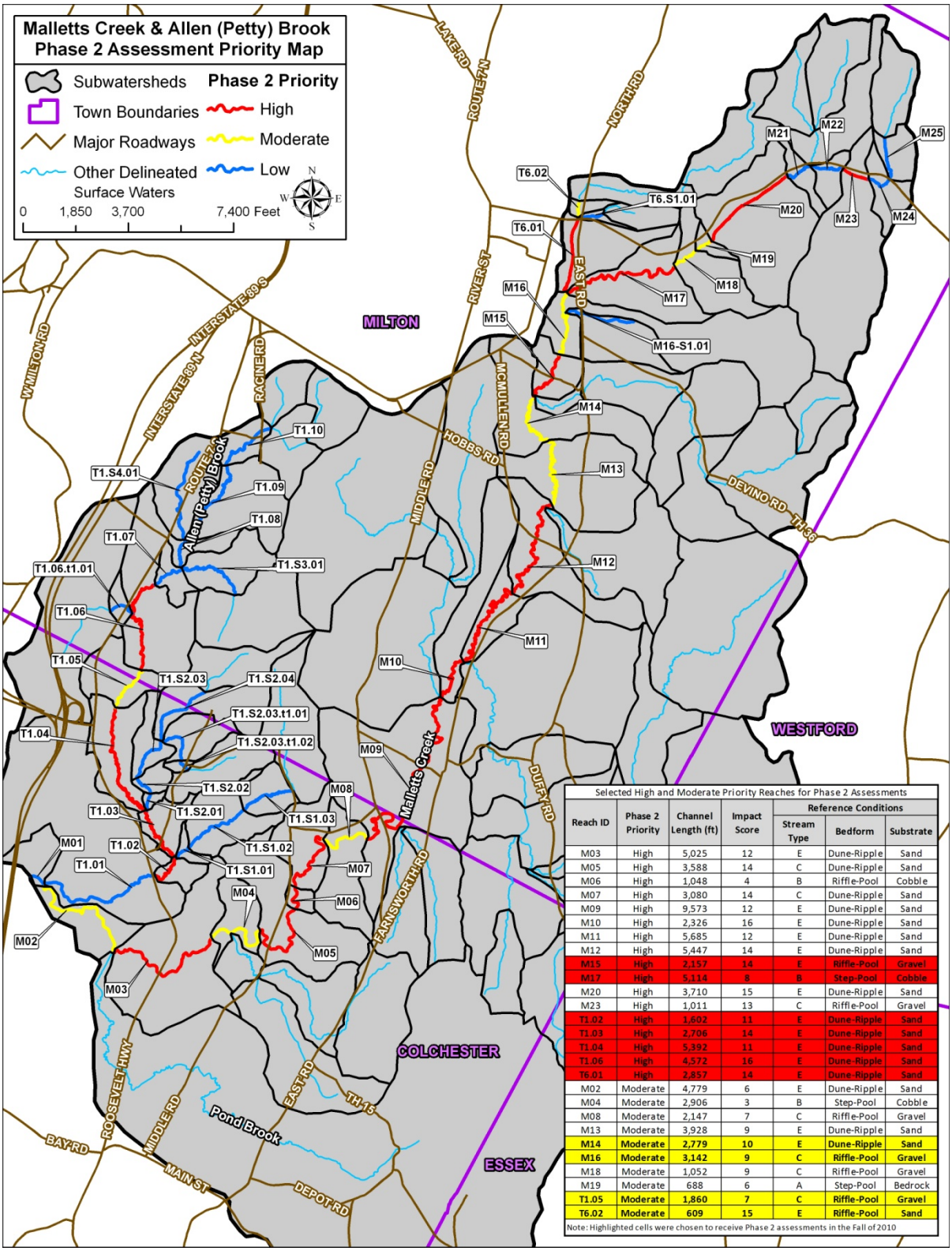
Ten (10) additional reaches have been included as moderate-priority reaches due to their relative impact ranking and location in the watershed. The total channel length for the selected reaches is 4.5 miles. Several of the lower scoring reaches such as M02, M04, and T1.05 were chosen because of their watershed location and drainage areas. These reaches often connect two higher ranking reaches and should be included in order to obtain a contiguous dataset up the channel network from Lake Champlain to the headwaters. Other reaches were ranked moderately because impacts could not be fully determined remotely or the reach was not accessible during windshield surveys, such as reach M08.

*Low Priority Reaches*

The remaining 24 reaches were given a low priority for Phase 2 assessments. These reaches either had low impact scores (1-7), were very small in size, or had significant wetland influences that would prohibit fluvial assessments.

*2010 Phase 2 Reaches*

A total of 11 reaches (6.2 miles) were selected for additional Phase 2 assessments in the fall of 2010. These reaches are highlighted within Figure 4.16.




Selected High and Moderate Priority Reaches for Phase 2 Assessments

| Reach ID | Phase 2 Priority | Channel Length (ft) | Impact Score | Reference Conditions | | |
|---|---|---|---|---|---|---|
| | | | | Stream Type | Bedform | Substrate |
| M03 | High | 5,025 | 12 | E | Dune-Ripple | Sand |
| M05 | High | 3,588 | 14 | C | Dune-Ripple | Sand |
| M06 | High | 1,048 | 4 | B | Riffle-Pool | Cobble |
| M07 | High | 3,080 | 14 | C | Dune-Ripple | Sand |
| M09 | High | 9,573 | 12 | E | Dune-Ripple | Sand |
| M10 | High | 2,326 | 16 | E | Dune-Ripple | Sand |
| M11 | High | 5,685 | 12 | E | Dune-Ripple | Sand |
| M12 | High | 5,447 | 14 | E | Dune-Ripple | Sand |
| M15 | High | 2,157 | 14 | E | Riffle-Pool | Gravel |
| M17 | High | 5,114 | 8 | B | Step-Pool | Cobble |
| M20 | High | 3,710 | 15 | E | Dune-Ripple | Sand |
| M23 | High | 1,011 | 13 | C | Riffle-Pool | Gravel |
| T1.02 | High | 1,602 | 11 | E | Dune-Ripple | Sand |
| T1.03 | High | 2,706 | 14 | E | Dune-Ripple | Sand |
| T1.04 | High | 5,392 | 11 | E | Dune-Ripple | Sand |
| T1.06 | High | 4,572 | 16 | E | Dune-Ripple | Sand |
| T6.01 | High | 2,857 | 14 | E | Dune-Ripple | Sand |
| M02 | Moderate | 4,779 | 6 | E | Dune-Ripple | Sand |
| M04 | Moderate | 2,906 | 3 | B | Step-Pool | Cobble |
| M08 | Moderate | 2,147 | 7 | C | Riffle-Pool | Gravel |
| M13 | Moderate | 3,928 | 9 | E | Dune-Ripple | Sand |
| M14 | Moderate | 2,779 | 10 | E | Dune-Ripple | Sand |
| M16 | Moderate | 3,142 | 9 | C | Riffle-Pool | Gravel |
| M18 | Moderate | 1,052 | 9 | C | Riffle-Pool | Gravel |
| M19 | Moderate | 688 | 6 | A | Step-Pool | Bedrock |
| T1.05 | Moderate | 1,860 | 7 | C | Riffle-Pool | Gravel |
| T6.02 | Moderate | 609 | 15 | E | Riffle-Pool | Sand |

Note: Highlighted cells were chosen to receive Phase 2 assessments in the Fall of 2010

**Figure 4.16** Phase 2 Assessment priority reaches in the Malletts Creek and Allen Brook Watershed

## 5.0 PHASE 2 RESULTS

The following section includes narratives describing the Phase 2 results and a summary of the geomorphic and habitat conditions. Detailed summaries of geomorphic and habitat data for each segment are provided in Appendix B.

### 5.1 REACH NARRATIVES

**M14-A**

M14-A is a short segment, 261 ft in length, which begins at the reach break with M13 just downstream of the very broad valley setting and ends at a large beaver dam upslope. The reach was segmented because of the extensive ponding caused by the beaver dam. The channel is situated in a very broad valley with an overall channel slope of 1.1%. Currently, the segment has one primary thread which drains the outlet of the beaver dam and several smaller threads that have formed from impounded water spilling over the floodplain upstream of the beaver dam. Evidence of flood chutes and large abandoned avulsions downstream are indicative of historical beaver dam breaching. When these events occurred, considerable amounts of sediment and water rapidly change the channel's planform. These features are natural and the channel exhibits its reference E-type condition with dune-ripple bedform (Figure 5.1). The width-to-depth ratio (WDR) and entrenchment ratios (ER) are 5.0 and 41.9, respectively. No incision was observed in this segment. The incision ratio (IR) is 1.0. The median substrate size is sand (70%) and the channel has moderate sinuosity.

Habitat in segment M14-A is abundant (RHA score = "Good"). Both the woody debris and pool densities are in "reference" condition with 343 LWD/Mile and 81 Pools/Mile, respectively (Figure 5.2). One nice undercut was observed upstream of the cross-section location. Geomorphically, the segment has some minor impacts associated with the beaver dam. These impacts are natural, so the overall RGA score remains in "Good" condition. The channel evolution model (CEM) does not do a great job characterizing channels affected by so much beaver activity. Incision and widening was not present in the segment, but beaver activity has led to extensive shifts in planform. Because of the natural planform shifts, but also the relatively stable setting, stage I of the F-model CEM was chosen.

**Figure 5.1** Cross-section location with E-type geometry

**Figure 5.2** Great habitat feature with LWD and undercut bank

**M14-B**

This segment was only assessed for bank and buffer conditions because extensive beaver activity impounds the entire channel length of 2,518 ft (Figure 5.3). The very broad valley and abundance of alders and other fast growing woody species makes this segment ideal for beaver inhabitance (Figure 5.4). Under reference conditions the channel was probably very similar to its current impounded state. Beaver activity greatly increases the time it takes for water to flow downstream, and the dams act as sediment sinks allowing fine silts and sands to settle out and aggrade. The channel is extremely well buffered because of the abundance of wetlands in the wide valley. Professional judgment was used to determine the RGA score as "Good" and E5-type channel morphology with dune-ripple bedform.

**Figure 5.3** Large beaver dam at segment break with M14-B

**Figure 5.4** Typical impounded setting with many alders

**M15-A**

M15-A, like M14-B, is impounded by beaver activity (Figure 5.5). The segment is 671 feet in length and extends from the reach break with M14-B at the confluence with tributary T5.01 and ends approximately 400 feet downstream of the Kingsbury Road crossing. Bank and buffer conditions were surveyed and professional judgment was assigned for the geomorphic condition (RGA score = "Good"). An E5-type channel with dune-ripple bedform would likely occur if the segment was not so heavily impounded.

**Figure 5.5** Large beaver dam at downstream end of M15-A

**M15-B**

Segment M15-B is 1,487 feet in length with an average channel slope of 0.4%. The segment begins at the end of impoundment and extends up to the reach break with M16 about 850 feet upstream of the Kingsbury Rd crossing where the confinement changes. The valley setting is very broad by reference. The channel exhibits E-type geometry with riffle-pool bedform which is consistent with the reference stream type designation (Figure 5.6). The width-to-depth and entrenchment ratios are 9.5 and 22.3, respectively. No incision was observed at the cross-section location (IR = 1.0), however, some minor incision was observed upstream of the Kingsbury Road crossing. Substrate is slightly coarser in this segment than observed in the reaches below, with fine gravel representing the median substrate type (36%). The Kingsbury Road crossing has been recently replaced and may have previously had some erosion problems (Figure 5.7). Angular fill rock typical of road footings was found in abundance downstream of the road crossing suggesting that the previous crossing may have blown out.

**Figure 5.6** Downstream view of riffle-pool bedform

**Figure 5.7** Kingsbury Road Crossing inlet looking downstream

The habitat and geomorphic condition in segment M15-B has been impacted by historical channel straightening. The woody debris recruitment potential has been slightly reduced by bank and buffer

impacts in the left corridor, but the density still remains in reference condition (LWD/Mile = 185). Pools and undercut banks are also in reference conditions with 67 Pools/Mile and 46 Undercuts/Mile, respectively. The overall RHA score is in "Fair" condition. The historical channel straightening, which has led to neck-cutoffs and a few floodchutes decreased the planform score of the RGA (RGA score = "Fair"). As mentioned above, some incision was observed in the upstream end of the segment but not enough incision was observed to indicate channel evolution. The channel is responding to impacts from straightening and these adjustments are lateral; however the segment is in stage I of the CEM (F-Model). Additional widening will likely occur as the channel becomes more sinuous in the near future.

**M16**

Reach M16 is 3,142 feet in length with an average channel slope of 0.8%. The reach begins at the large meander bend that doubles back in the valley and ends upslope at the confluence with T6.01, a small tributary entering from the north. The valley is very broad, with no human caused change to its width. In some places, however, the valley naturally becomes slightly confined. These areas are short in length and have not been segmented out, because the channel geometry remains consistent throughout (WDR = 10.2; ER = 5.5; IR = 1.2). The channel bedform is riffle-pool by reference with C-type channel morphology (Figure 5.8). Coarse gravel is the median substrate type, comprising approximately 42% of the substrate observed in the channel. Where sand substrates were more prevalent there were no defined riffles and some dune-ripple formations. Where gravel substrate dominated, riffles occurred at an interval of 135ft, which is approximately 7 times the channel width (Figure 5.9).

**Figure 5.8** Downstream view of the cross-section

**Figure 5.9** Well-spaced riffle-pool sequence located mid-reach

Historical beaver activity on this reach, albeit a natural process, has played a large role on the current condition of the stream channel. Several breached beaver dams were observed in this reach and the changes in the base water level altered the sediment regimes. In most cases, large sediment deposits were observed upstream of these relic structures. This sediment was usually a dense mix of silt and other fine particles that settled out over the duration of the structures existence. With the dam gone the channel is responding by cutting down through the sediment in the form of headcuts (Figure 5.10). Headcuts migrating upslope will do so until the channel slope reaches equilibrium between the up and

downstream channels. The net effect of sediment aggradation and subsequent degradation as beaver dams come and go effectively neutralizes the adjustment processes observed on this reach (RGA score = "Good"). Stage I of the CEM was chosen because degradation through naturally aggraded, beaver-related substrate is the dominant adjustment process observed. The habitat condition score in M16 is also "Good." Woody debris was abundant (LWDs/Mile = 122), but pools were somewhat limited (Pools/Mile = 25).

**Figure 5.10** Two examples of headcuts migrating upstream through sediment aggraded historically by beaver activity

**M17-A**

Segment M17-A begins at the reach break where the Main Stem meets tributary T6.01 and extends upstream 916 feet to the segment break where the valley setting changes from an unconfined to a confined setting. The valley in M17-A is very broad and the segment has an average channel slope of 2.0%. This reach was segmented to highlight the straightening and planform changes downstream of the East Road Crossing. Currently, the channel exhibits E-type morphology with plane bedform (Figure 5.11). The width-to-depth and entrenchment ratios are 8.7 and 32.5, respectively. However, there is strong evidence to suggest that the reference channel is a C-type. Historical aerial photographs of Chittenden County show the channel with a meandering profile (Figure 5.12). The sinuosity of the channel in 1962 was about 1.5, and presently it is less than 1.1. The median substrate size observed in this segment was gravel (49%), but a large proportion of cobble substrate was also observed (32%).

**Figure 5.11** E-type channel morphology at cross-section

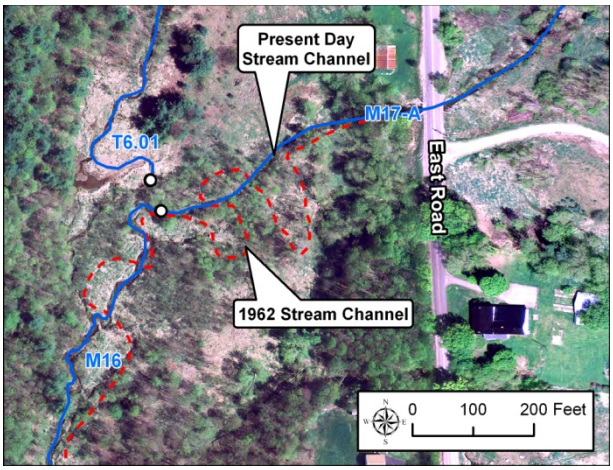



**Figure 5.12** Historical channel planform in segment M17-A

The impacts to the natural planform of the channel have also impacted the habitat condition of this segment. M17-A has limited wood (LWD/Mile = 40), pools (Pools/Mile = 28), and undercut banks (UCB/Mile = 17), which reduced the overall habitat score to "Fair" condition. It is evident in Figure 5.11 that the banks and buffers in the lower portion of the segment have been recovering from previous deforestation. The plant assemblages are typical of old field succession occurring in a wet environment. Boxelder (*Acer negundo)*, speckled alder (*Alnus rugosa)*, and black willow (*Salix nigra)* are the dominant woody species in the lower segment. The geomorphic condition of M17-A has been reduced as a result of several adjustment processes (RGA score = "Fair"). The straightening which occurred sometime between 1962 and the present likely caused the channel to degrade and down-cut. However, vertical changes in the channel were not observed in the cross-section; only minor incision (IR = 1.1) was noted upstream and downstream. The lack of incision suggests that the bed elevation might be aggrading sediment from upslope. Several large sediment deposits were observed at the upstream end of reach M16, indicative of a high sediment load (Figure 5.13). As more coarse sediment spills into this segment, widening and planform adjustments are likely to recreate a similar sinuous setting as observed in 1962. Stage I of the CEM describes the state of this segment, because no active incision associated with historical straightening was noted. Widening and shifts in planform will likely be more prominent adjustment processes in the future.

**Figure 5.13** Sediment deposits at the reach break between M17-A and M16

**M17-B**

Segment M17-B begins at the segment break where valley confinement changes and ends immediately upstream of the Forest Road Crossing upslope. In total the segment is 4,197 feet in length with an average channel slope of 4.2%. The valley is predominately in a semi-confined setting; however, several small sections had an unconfined setting. The channel exhibited Ba-type morphology, with width-to-depth and entrenchment ratios of 9.7 and 2.2, respectively (Figure 5.14). Although the width-to-depth ratio was slightly lower than the +/- 2.0 confidence interval of the Rosgen system, B-type morphology best summarizes the observed condition of the channel. The dominant bedform of M17-B was step-pool, except in areas where the valley became unconfined. In these short stretches the channel tended to have a naturally braided planform (Figure 5.15). Substrate tended to be larger in areas with steep slope changes and finer where the valley width was wider. The median substrate size was cobble (45%).

**Figure 5.14** Excellent B-Type channel with step-pool bedform

**Figure 5.15** Unconfined valley with braided bedform

The habitat in this segment was in “Good” condition. Woody debris density was reference (LWD/Mile = 212) and pools were abundant and well-spaced (Pools/Mile = 64). The only major impact to the habitat condition was some lack of buffer plant diversity in the lower reach where the understory was cleared

as a sugarbush (Figure 5.16). Many brook trout (*Salvelinus fontinalis)* and other fish were observed while assessing this segment. High amounts of coarse particulate organic matter provide the necessary resources for healthy benthic communities. Geomorphically, the segment is stable, with few notable adjustments (RGA score = "Good"). This segment is in stage I of the CEM. The upstream end of the segment has two large cascades that control any vertical adjustment (Figure 5.17). These features may inhibit fish passage, but overall channel connectivity is good.

**Figure 5.16** Upstream view of channel and valley in sugarbush

**Figure 5.17** Cascade grade control in upper segment

**T6.01-A**

Reach T6.01 was segmented twice to best characterize the diversity in channel characteristics and impacts associated with beaver and anthropogenic activities. Segment T6.01-A begins at the confluence with the main stem at the upper end of M16 and ends at a large beaver dam observed under the utility line right-of-way. In total, the segment is 994 feet in length with an average channel slope of 0.9%. The segment has an unconfined valley setting with a very broad valley type. Like many of the lower-sloped reaches on Malletts Creek, beaver activity has been a constant factor in the geomorphic conditions observed (Figure 5.18). On T6.01-A, no active beaver dams were observed at the time of survey, but many relic structures were present. The channel exhibits E-type morphology with minor incision and dune-ripple bedform (WDR = 5.4, ER = 39.4; IR = 1.2; Figure 5.19).

**Figure 5.18** Channel atop a breached beaver dam mid-reach

**Figure 5.19** Cross-section with E-type morphology

Habitat in this segment has been impacted by historical land use practices (e.g., agriculture) and the beaver activity (RHA Score = "Fair"). Woody debris and pool density were 111 LWD/Mile and 63 Pools/Mile, respectively. The high density of LWD can be attributed to the high concentration of small and medium-sized pieces around relic beaver dams. Some dredging was noted at the upstream end of the segment where the adjacent field is used for hay. The dredging and straightening continues up into the other two segments. The area of dredging in the upper segment and shifting planform in the lower segment from beaver dam breaching were the primary adjustments to this reach (RGA Score = "Fair"). T6.01-A is in early stage II of the channel evolution model. The channel is only slightly incised, but several small headcuts associated with the blown-out beaver dams indicate potential for future degradation.

**T6.01-B**

T6.01-B is impounded by beaver activity and only partially assessed for bank and buffer conditions. The segment is 460 feet in length and extends from the segment break with T6.01-A at the utility line right-of-way up to the confluence with an unnamed tributary that enters from the east. The segment has been historically straightened and dredged, which confines the extent of impoundment to the size of the dredge channel (Figure 5.20; Figure 5.21). The east buffer area of this segment is used for hay production and has a limited natural buffer width. If the beaver dam were to breach it is likely that that the channel form would resemble the upstream segment T6.01-C with an unstable, incised state. Professional judgment was used to determine the RGA score as "Fair" and G5-type channel morphology with plane bedform.

**Figure 5.20** Beaver dam at the downstream end of the segment

**Figure 5.21** Impoundment bound by the extent of dredging

**T6.01-C**

Segment T6.01-C begins at the end of the ponding where the tributary enters from the east and ends at the reach break upstream of the Main Street crossing. The segment is 1,403 feet in length with an average channel slope of 1.1%. The valley setting is very broad with some impacts to the valley width because of East Road. Extensive dredging, channel straightening, and incision has led to a stream type departure from reference E-type morphology to the current G-type (Figure 5.22). Dredging has made floodplain access virtually impossible. The channel has an incision ratio of 2.8, and the width-to-depth and entrenchment ratios are 9.3 and 1.6, respectively. The channelized state of the segment has altered the reference dune-ripple bedform to the current plane bed condition. The median observed substrate size was sand (60%) and plane bedform was dominant.

**Figure 5.22** Cross-section with G-type channel morphology

**Figure 5.23** Downstream view of floodplain and small headcuts

The extensive dredging and channel straightening with little buffer resistance has led to a highly incised G-type channel. Three small headcuts were observed downstream of the Main Street crossing. These features were armored with coarse material to prevent any additional migration upstream (Figure 5.23).

Geomorphically, the degradational adjustments that have shaped the current state of this channel are likely over. The channel is established at a lower elevation and the upstream headcut migration has been mitigated. The segment will likely transition into stage II of the CEM and will widen and erode laterally to develop a more sinuous planform. The RGA score is in "Fair" condition, but this segment should be watched carefully for erosion problems and planform shifts. The habitat, a reflection of the degraded geomorphic state, is also in "Fair" condition. Wood density was very low (LWD/Mile = 33), but pools were more frequently observed in the deeply incised channel (Pools/Mile = 63).

**T6.02**

T6.02 is a reach, 609 feet in length, that begins just upstream of the Main Street crossing and ends approximately 600 feet downstream of a driveway crossing off North Road. The hydrological condition of this reach has changed because of an influx of stormwater runoff from the Hunting Ridge Development. The development, built around the turn of the millennia, lacks sufficient stormwater best management practices to reduce the large volume of water which surge off the impervious surfaces and down the steep slope into the tributary. The channel has E-type morphology with dune-ripple bedform. The width-to-depth and entrenchment ratios are 9.0 and 19.3, respectively. Much of the very broad valley is occupied by wetlands. The primary thread of the channel dissipates into a wetland for a brief extent where the vegetation is herbaceous (Figure 5.24).

The short length and small drainage area of this reach made it difficult to assess the habitat conditions, especially because the channel dissipates into a wetland for a portion of the reach. The stream channel runs adjacent to several homes on North Road and Main Street which had a significant impact on the bank and buffer conditions. The left buffer was predominately herbaceous with little canopy cover and areas of the near bank were mowed on both sides of the channel. Wood density was skewed higher because of the short reach length and one large debris jam with several pieces of wood (LWD/Mile = 112). The overall habitat score was of "Fair" condition. Geomorphically, the increased flow from upslope land use changes has caused changes in planform and some minor degradation (RGA Score = "Fair"). The channel avulsed around a large tree and into a landowner's yard, requiring the fence line to be moved (Figure 5.25). Channel evolution stage is difficult to pinpoint, because of the presence of wetlands and minor degradation. Stage I was chosen because no significant incision was observed in the field.

**Figure 5.24** Area of channel that dissipates into wetland

**Figure 5.25** Upstream view of channel avulsion

**T1.02**

Assessment of Allen (Petty) Brook began on reach T1.02, because reach T1.01 is a large wetland found west of Route 7. T1.02 begins just upstream of the Route 7 bridge and extends 1,602 feet upstream, ending at the confluence with sub-tributary T1.S1 entering from the east. This reach is set in a very broad valley, with an average channel slope of 0.1%. The low slope, high sinuosity (1.6) and sand substrate (60%) are ideal conditions for the dune-ripple bedform observed. Channel morphology is E-type with width-to-depth and entrenchment ratios of 6.6 and 11.6, respectively (Figure 5.26). Minor channel incision was observed at the cross-section; however, more pronounced abandoned floodplain features could not be discerned through the dense herbaceous riparian vegetation. A few small beaver dams were observed upstream of the reach break. These dams were not substantial enough to justify reach segmentation.

**Figure 5.26** T1.02 cross-section with E-type morphology

T1.02 has changed significantly over the last 50 years. Much of the readily accessible floodplain was once used for hay production and the channel was pushed up against the valley wall to the south. In total, approximately 59% of the channel was once straightened. Since the land was abandoned for

agricultural uses it has gained back considerable amounts of sinuosity and stability. The geomorphic score of the reach is of "Good" condition. Only minor adjustments in planform are taking place because degradation and aggradation is historical. Stage I of the CEM (F-Model) was chosen because of the lack of pronounced abandoned floodplain features and minimal channel incision. Increased stabilization is predicted as larger woody species buffer the stream and reduce the minor lateral adjustments noted in the field. The habitat condition is also "Good," with abundant pools (Pools/Mile = 65) and undercut banks (UCB/Mile =36). The woody debris density was reduced, because of historical land clearings (LWD/Mile = 9).

**T1.03**

Reach T1.03 begins at the confluence with sub-tributary T1.S1 and ends upstream at the confluence with sub-tributary T1.S2. The reach is 2,706 feet in length with an average channel slope of 0.3%. The valley setting of the reach is very broad and the channel has a sinuosity of 1.4. The channel exhibits E-type morphology with dune-ripple bedform. The median substrate type is sand, which comprises approximately 85% of the bed. The width-to-depth ratio and entrenchment ratio are 6.0 and 9.8, respectively (Figure 5.27). Minor incision was noted through much of this reach (IR = 1.2), with more sever degradational impacts observed downstream of the culvert crossing mid-reach.

**Figure 5.27** T1.02 cross-section with E-type morphology

The Coon Hill Road crossing is located mid-reach. This culvert crossing has numerous problems that should be addressed. The culvert width of 5.0 feet is only 30% of the bankfull channel width. This severe constriction causes water to back up behind the structure a few feet above the top of the culvert inlet. When water backs up above the undersized culvert hydraulic head is formed and water is forced through the structure. The deep scour pool and eroding banks downstream are the result of this process (Figure 5.28). Upstream the culvert inlet is partially blocked by sediment and woody debris. Lots of aggradation has taken place as well as bank slumping and erosion (Figure 5.29). This structure is recommended for replacement.

**Figure 5.28** Scour pool downstream of the undersized culvert

**Figure 5.29** Slumping, erosion, and aggradation upstream

The RGA condition has been impacted by the crossing and the subsequent geomorphic processes it has triggered (RGA score = "Fair"). Downstream of the structure degradation and planform shifts are the dominant processes observed and upstream aggradation of sediment and some widening and planform shifts were observed. The channel is in stage III of the CEM and will likely experience more widening and planform above and below the structure as it tries to equilibrate. Habitat in T1.03 is in "Good" condition. The density of woody debris (LWD/Mile = 160) and pool occurrence (Pools/Mile = 80) were not greatly altered by the adjustments associated with the crossing. Like the downstream reach, T1.03 is recovering from past land clearing for agricultural purposes. However, the bank and buffer conditions of this reach are much further along in the sequence of succession. Larger trees and abundant shrub/scrub vegetation was observed, especially upstream of the crossing.

**T1.04**

Reach T1.04 begins at the confluence with sub-tributary T1.S2 and ends at the VAST trail crossing east of the large apartment complex off of Route 7. The reach is 5,392 feet in length and the valley type is very broad. Channel slope is 0.5% and sinuosity is moderate (1.3). The channel is E-type by reference with dune-ripple bedform (Figure 5.30). Channel geometry is typical of E-type channels with a width-to-depth and entrenchment ratio of 7.4 and 7.6, respectively. A moderate level of incision was observed at the representative cross-section (IR = 1.3), yet only minor incision persisted throughout the reach. Sand is the median substrate (53%) although some areas where gravel substrate was dominant were also observed. Also, several pockets of dense clay were observed, often near mass failures (Figure 5.31). The clay was heavily varved - an indication of the glacial lakes (e.g. Glacial Lake Vermont and Champlain Sea) that once occupied the area.

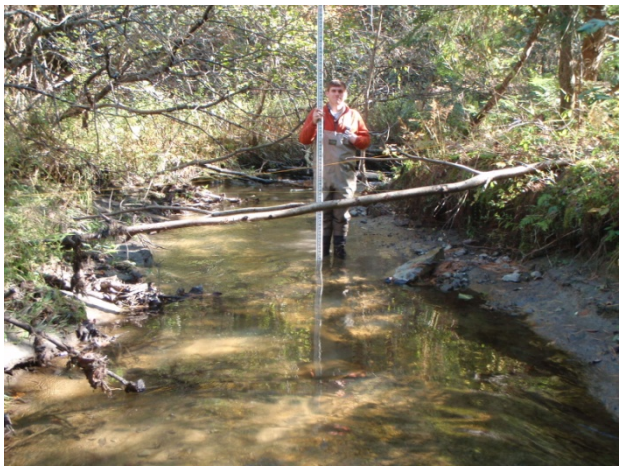


**Figure 5.30** Cross-section with E-type morphology

**Figure 5.31** A mass failure with exposed varved clays

The habitat in this segment was in "Good" condition. Woody debris density (LWD/Mile = 166) and pool occurrence (Pools/Mile = 56) were both high. About 3,000 feet upstream of the reach break the near bank and buffer vegetation shifted from primarily shrubby with lots of alders (*A. rugosa)*, to a more forested setting with more eastern hemlocks (*Tsuga canadensis)*. The shrubby section, which was more representative of the reach as a whole, was probably used for agriculture before being left to revegetate to a natural state. Some evidence of straightening was observed in the lower reach in the historical aerial photographs. The subsequent planform adjustments following the straightening slightly impacted the overall geomorphic condition (RGA score = "Fair"). The channel is in stage III of the CEM, because of the minor incision which persisted throughout the reach.

**T1.05**

Reach T1.05 begins at the VAST trail crossing and extends upstream 1,860 feet to the reach break where the valley confinement changes slightly. The reach has an average channel slope of 0.4% and a moderate sinuosity. T1.05 is set in a narrow to broad unconfined valley. The stream channel exhibits reference E-type morphology with dune-ripple bedform (Figure 5.32). The width-to-depth and entrenchment ratios are 6.8 and 6.2, respectively. The floodplain throughout the reach is readily accessible with no observed incision (IR = 1.0). Substrate is almost entirely comprised of sand (77%) with some finer material and gravel.

The habitat score in reach T1.05 is in "Reference" condition. Woody debris density was extremely high (LWD/Mile = 332) and debris jams were abundant (DJ/Mile = 28). Pool density was slightly lower than expected (Pools/Mile = 22; Figure 5.33). The high volume of non-cohesive sand substrate limited pool formation to areas of localized hydraulic variability, such as areas where large debris jams created scour pools. The bank and buffer conditions reflect several decades free of management or clearing. The extent of the riparian buffer observed in the 1962 aerial images are very similar to the buffer observed today. The buffer is primarily composed of eastern hemlocks (*T. canadensis*) with some large, sporadic hardwoods. Geomorphically, the reach is stable, with few adjustments noted (RGA Score = "Reference"). Some minor shifts in planform and migration were caused by the many debris jams noted, but these

changes are natural. The recent development along Route 7 has increased the stormwater discharge into the reach, but the wide buffer seems to be adequately mitigating any negative impacts. The reach is in stage I of the CEM, with no evidence of recent incision or any significant adjustment.

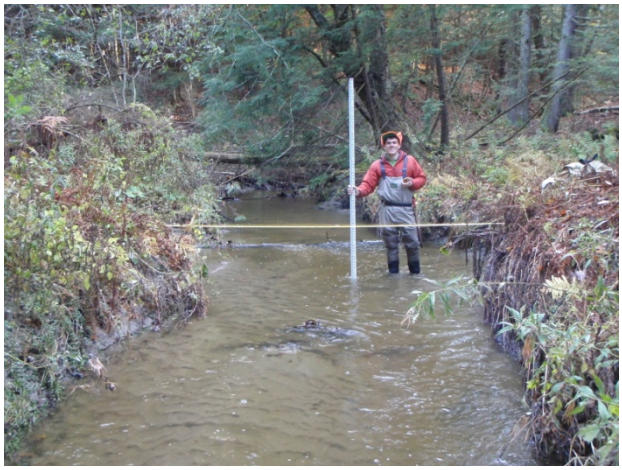


**Figure 5.32** Cross-section with reference E-type morphology

**Figure 5.33** Excellent habitat with abundant LWD and DJs

**T1.06-A**

Reach T1.06 was segmented twice because of bank and buffer conditions, as well as property access restrictions. T1.06-A begins at the slight change in valley confinement and ends upstream just above the confluence with sub-tributary T1.06.t1.01. The segment is 2,816 feet in length with an average channel slope of approximately 0.4%. The valley conditions in this segment are broad with no human impacts to the valley width. E-type channel morphology was observed with very well-formed dune-ripple bedform (Figure 5.34). The width-to-depth, entrenchment, and incision ratios were 7.5, 9.9, and 1.0, respectively. The dense coniferous vegetation makes it incredibly difficult to remotely observe the planform of the channel in the lower segment; however, sinuosity was determined to be high (>1.5). Sand was the dominant substrate type observed in this segment; it represented 82% of the particle distribution.

The ecological setting and habitat condition of this segment is very similar to T1.05. Woody debris density and debris jam density were extremely high, with 442 LWD/Mile and 31 DJ/Mile, respectfully (Figure 5.35). Pool density was high as well with 123 Pools/Mile observed. The excellent condition of the riparian buffer and near banks has helped preserve this segment's habitat integrity (RHA Score = "Reference"). Like T1.05, limited clearing was observed in T1.06-A over the last 50 years. Many trees had a diameter at breast height that exceeded 30 inches. The sub-tributary located at the upper end of this segment is highly managed. The channel on the western side of Route 7 drains into a very large stormwater detention basin, the outlet of which crosses under the highway and becomes T1.06.s1.01. The stormwater inputs and other road drainage ditches that enter sub-tributary T1.06.s1.01 have created some geomorphic instability in the upper portion of segment T1.06-A. Migration and neck cutoff potential are the most common impacts observed. The overall RGA score is in "Good" condition. Despite minor impacts in the upper segment the channel remains in stage I of the CEM.

**Figure 5.34** Well-formed dune-ripple bedform

**Figure 5.35** Very large debris jam with abundant LWD

**T1.06-B**

Segment T1.06-B was parsed out because of property restrictions and changes to the bank and buffer condition. The segment, 1,009 feet in length, begins just upstream of the confluence with sub-tributary T1.06.s1.01 and ends about 110 feet upstream of the Sweeny Farm Road (Figure 5.36). The segment is set in a very broad valley, with some human caused change in the valley width. Bank and buffer conditions were assessed using aerial imagery and the corridor was walked along route 7. Professional judgment was used to determine a geomorphic condition (RGA score = "Fair"). The channel observed from the road exhibits E-type morphology with plane bedform. Bank and buffer impacts, channel straightening and the undersized culvert at Sweeny Farm Road were considered in this decision (Figure 5.37).

**Figure 5.36** Downstream view of Sweeny Farm Rd culvert inlet

**Figure 5.37** Buffer <25ft and channel straightening in T1.06-B

**T1.06-C**

Segment T1.06-C is the 747 foot section of the reach that remains upstream of the restricted property access portion. It was assessed fully to capture the impacts from the nearby development. The segment has an average channel slope of 0.3% and it is set in a broadly unconfined valley. The channel exhibits E-

type morphology with plane bedform (Figure 5.38). The width-to-depth and entrenchment ratios are 7.9 and 12.2, respectively. Minor incision was observed in segment T1.06-C, the channel had impacts associated with historical channel alteration and straightening (IR = 1.2). The median substrate size observed was sand (71%), with some fining of silts (15%). The Allen Brook Drive crossing had significant impacts on the channel condition. The culvert is a constriction to the bankfull channel width and the structure occupies approximately 20% of the total segment length. Extensive fill was placed in the valley to create the road footing (Figure 5.39) for the development to the east and two stormwater inputs were observed on the upstream end of the structure.

**Figure 5.38** Plane bedform with E-type morphology

**Figure 5.39** Downstream view from atop Allen Bk Drive culvert

The habitat score for the segment is in "Fair" condition. Impacts from low buffer widths and channel crossings were severe and responsible for the stream habitat type departure from dune-ripple to plane bed. The invasive grass species reed canary grass (*Phalaris arundinacea)* was found commonly along both banks. Woody debris density was quite low (LWD/Mile = 56), but pools and undercut banks were common and often unstable or poorly formed (Pools/Mile = 42; UCB/Mile = 63). Most impacts that influenced the habitat condition also affected the geomorphic condition (RGA Score = "Fair"). The degradation adjustment from ongoing incision and straightening was the most severe impact noted. Stage II of channel evolution was chosen to highlight impacts that will likely continue in this segment.

## 5.2 Phase 2 Summary Results

A map of all reaches selected for Phase 2 assessments as well as the existing stream type designation can be found below in Figure 5.40. Rapid Habitat Assessment (RHA) and Rapid Geomorphic Assessment (RGA) result summaries can also be found below in Table 5.1. Additional, segment-specific data summaries for assessed Phase 2 reaches are provided in Appendix B.

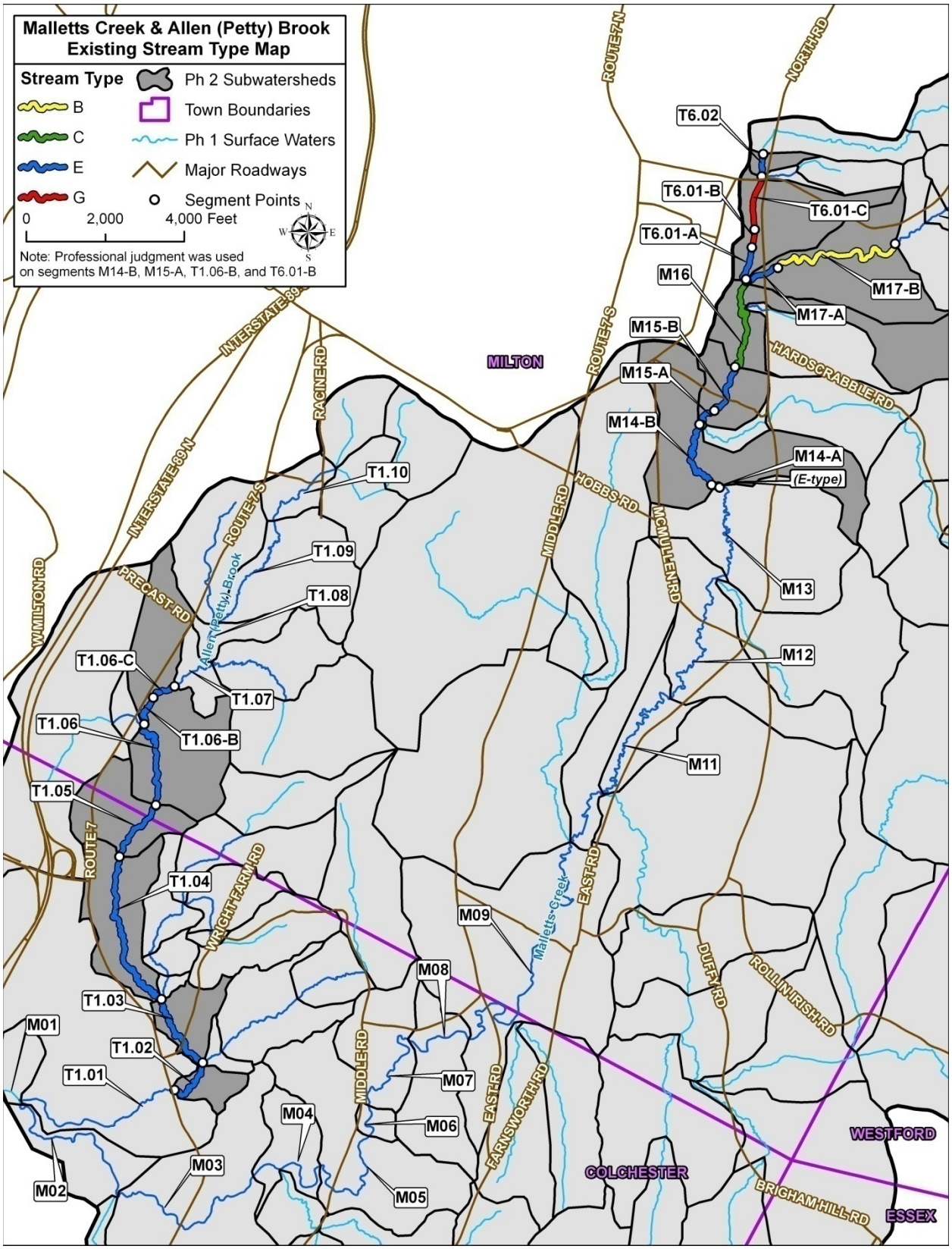



**Figure 5.40** Phase 2 Assessment stream types in the Malletts Creek and Allen Brook watersheds

**Table 5.1** RHA and RGA scores for Phase 2 assessed reaches/segments

| Surface Water | Phase 2 Segment ID | RHA Score | RHA Condition | RGA Score | RGA Condition | CEM Stage | Stream Sensitivity |
|---|---|---|---|---|---|---|---|
| Malletts Creek Main Stem | M14-A | 83% | Good | 83% | Good | I | High |
| | M14-B | Not Assessed: Segment Impounded by Beaver Activity | | | | | |
| | M15-A | Not Assessed: Segment Impounded by Beaver Activity | | | | | |
| | M15-B | 64% | Fair | 58% | Fair | I | Extreme |
| | M16 | 69% | Good | 65% | Good | I | High |
| | M17-A | 56% | Fair | 63% | Fair | I | Extreme |
| | M17-B | 79% | Good | 83% | Good | I | Moderate |
| Allen (Petty) Brook | T1.02 | 67% | Good | 79% | Good | I | High |
| | T1.03 | 72% | Good | 58% | Fair | III | Extreme |
| | T1.04 | 75% | Good | 63% | Fair | III | Extreme |
| | T1.05 | 87% | Reference | 88% | Reference | I | High |
| | T1.06-A | 89% | Reference | 76% | Good | I | High |
| | T1.06-B | Not Assessed: No Property Access | | | | | |
| | T1.06-C | 52% | Fair | 64% | Fair | II | Extreme |
| Unnamed Tributary | T6.01-A | 58% | Fair | 63% | Fair | II | Extreme |
| | T6.01-B | Not Assessed: Segment Impounded by Beaver Activity | | | | | |
| | T6.01-C | 41% | Fair | 44% | Fair | II | Extreme |
| | T6.02 | 43% | Fair | 54% | Fair | I | Extreme |

**Note:** RHA = Rapid Habitat Assessment; RGA = Rapid Geomorphic Assessment; CEM = Channel evolution model

## 5.3 Departure and Sensitivity Summary for Phase 2 Reaches

### *5.3.1 Departure Analysis*

The reference and existing sediment regime types have been mapped using data from the Phase 1 and 2 assessments (Figures 5.41 & 5.42). Although most segments are stable, some have undergone changes in sediment regime type due to channel incision and/or widening as a result of: 1) historical land uses, 2) encroachments or development in the river corridor, or 3) extensive straightening. Reach stream type departures are summarized below to better describe the reaches where physical changes in channel morphology have accompanied sediment regime changes (Table 5.2).

**Table 5.2** Summary of Stream Type Departures from Reference Conditions

| Surface Water | Phase 2 Segment ID | Stream Type Departure | Dominant Adjustment Type |
|---|---|---|---|
| Malletts Creek | M17-A | C to E | Degradation, Now Aggradation |
| Unnamed Tributary | T6.01-C | E to Gc | Degradation |

*Malletts Creek (M14-M17)*: In reference conditions, the assessed reaches found in the upper portion of Malletts Creek have stable sediment regimes characterized by coarse equilibrium and fine deposition. Although departure in stream type was limited to M17-A, M15-B also had some evidence of historical channel straightening. Currently both reaches have observed lateral adjustment processes, but the sediment regimes remain in coarse equilibrium. The beaver activity or lack of channel straightening has kept M14-A, M14-B, M15-A and M16 in a stable condition. Segment M17-B is the only reach assessed with a transport setting by reference. This sediment regime has not undergone any changes due to the excellent geomorphic condition and natural, forested riparian corridor.

*Allen (Petty) Brook (T1.02-T1.06):* In reference conditions, the assessed reaches found in Allen Brook would all have stable sediment regimes characterized by coarse equilibrium and fine deposition. The current condition remains in coarse equilibrium for reaches/segments T1.02, T1.05 and T1.06-A because of the limited geomorphic impacts and unmanaged buffer. Reaches/Segments T1.03, T1.04, T1.06-B and T1.06-C have undergone major historical channel straightening and are currently have an unconfined source and transport sediment regime. Road crossings in these reaches (Except T1.04) disrupt the sediment regimes further by constricting the channel and causing changes in the natural valley condition.

*Unnamed Tributary to Malletts Creek (T6.01-T6.02):* Tributary T6 has experienced extensive channel modifications for agricultural purposes. All segments have a sediment regime deviating from the coarse equilibrium and fine transport reference condition. The brook, which once had a broad accessible floodplain, has been pushed up against the western valley wall. Dredging of the channel in T6.01-C has greatly reduced floodplain connectivity and resulted in a fine source and transport sediment regime. Segments T6.01-A and T6.01-B have unconfined source and transport regimes. Major impacts were from straightening, dredging, and beaver activity. Reach T6.02 is a small channel considered to be in coarse equilibrium although upslope urbanization stressors are present.

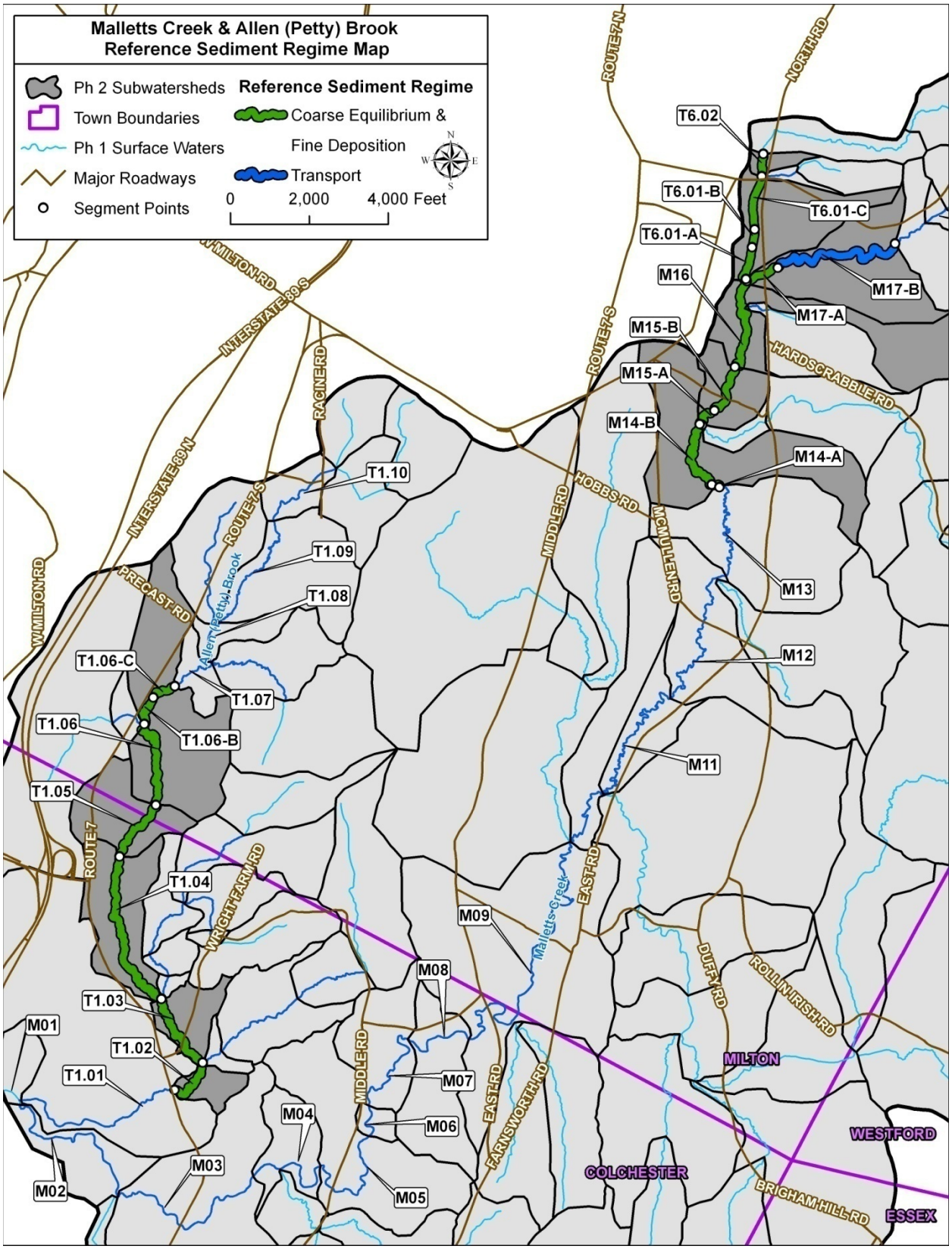



**Figure 5.41** Phase 2 Assessment reference sediment regime map for Malletts Creek and Allen Brook Watershed

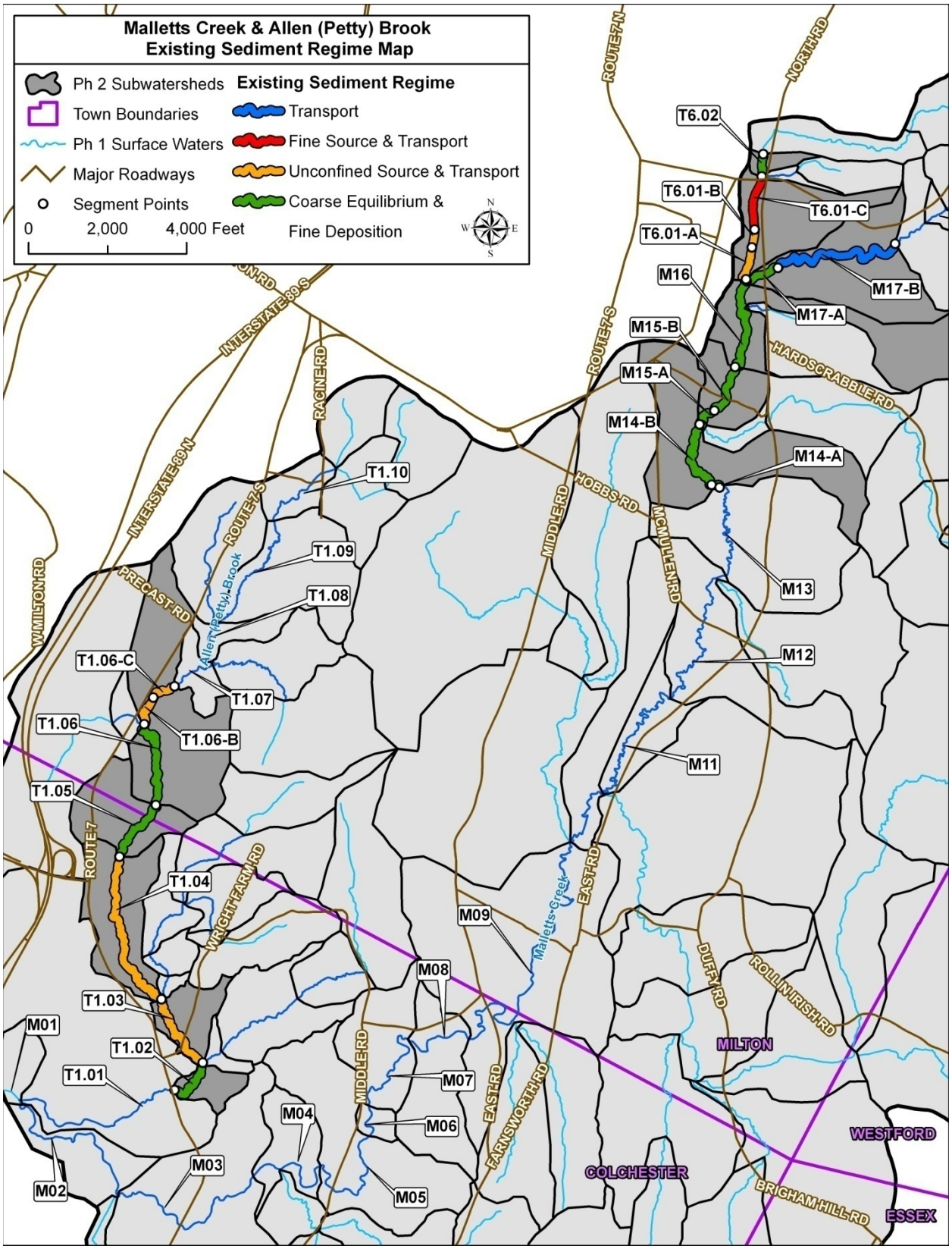



**Figure 5.42** Phase 2 Assessment existing sediment regime map for Malletts Creek and Allen Brook Watershed

### *5.3.2 SENSITIVITY ANALYSIS*

The methods outlined in the VTANR Corridor Planning Guide have been used to describe the stream sensitivities of the segments in the Malletts Creek and Allen Brook study area (Figure 5.43). Using the stream geometry and substrate data in conjunction with overall geomorphic stability (RGA score) as determined during the Phase 2 surveys, stream sensitivity ratings have been assigned to each segment (Figure 4.13). Seven (7) segments have heightened sensitivities of "Extreme" due to minor impacts on highly sensitive E5-type streams. The heightened stream sensitivity ratings on two segments, M17-A and T6.01-C, occurred because of stream type departures (STD) and channel degradation resulting from historical channel straightening, and incision.

**Table 5.3** Extremely sensitive segments and descriptions of the specific impacts and adjustments that are occurring to the stream

| Surface Water | Phase 2 Segment ID | Description of Impacts |
|---|---|---|
| Malletts Creek Main Stem | M15-B | Straightening, Planform Shifts; Non-Cohesive Substrate |
| | M17-A | Straightening (Degradation), Planform Shifts, Aggradation |
| Allen (Petty) Brook | T1.03 | Aggradation, Planform Shifts; Minor Degradation; Channel Constriction |
| | T1.04 | Aggradation, Planform Shifts; Minor Degradation |
| | T1.06-C | Straightening (Degradation), Planform Shifts |
| Unnamed Tributary | T6.01-A | Straightening (Degradation), Planform Shifts; Minor Dredging; Non-Cohesive Substrate |
| | T6.01-C | Straightening (Degradation), Planform Shifts; Extensive Dredging; Non-Cohesive Substrate |
| | T6.02 | Straightening, Planform Shift; Upslope Stormwater Impacts |

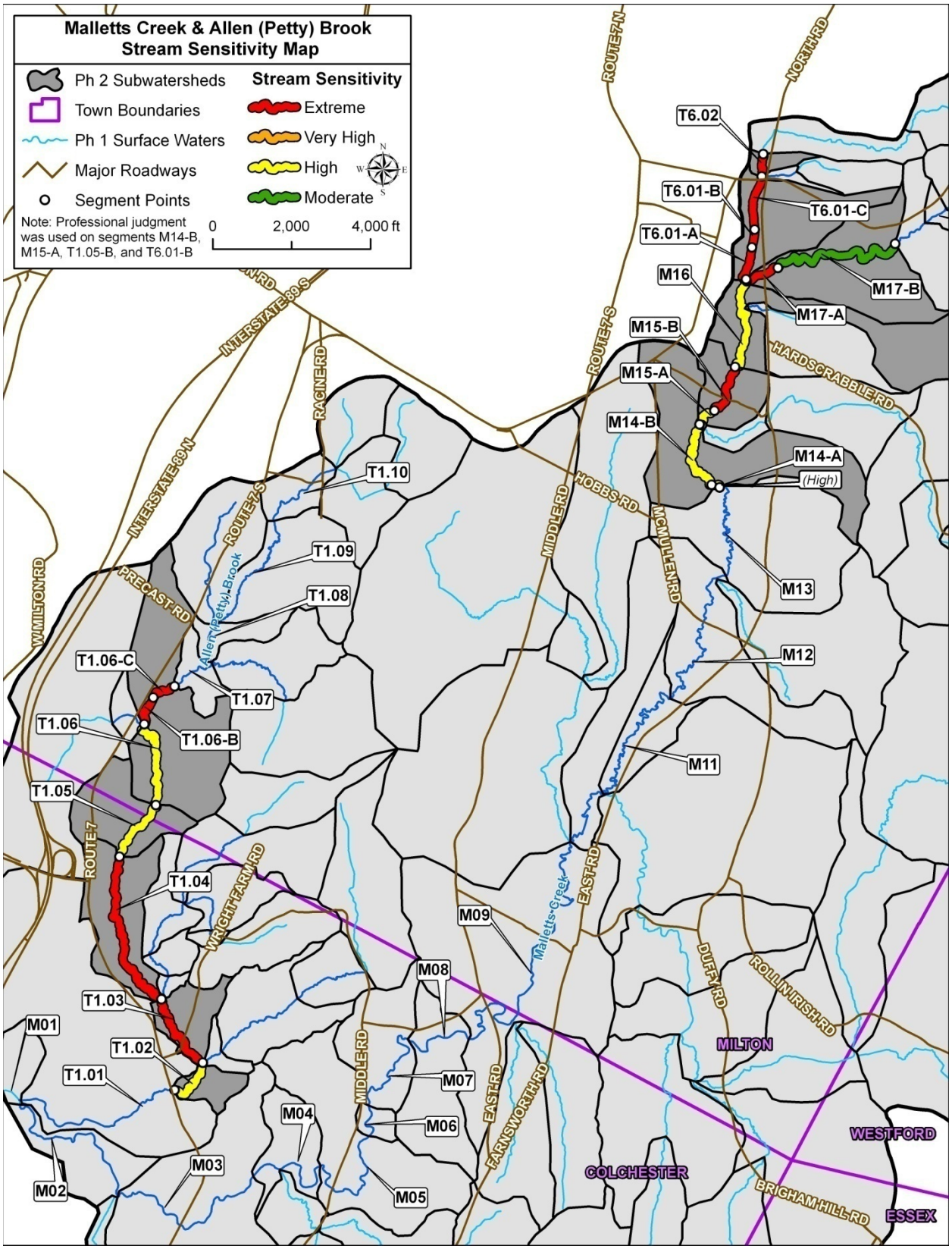



**Figure 5.43** Phase 2 Assessment priority reaches in the Malletts Creek and Allen Brook Watershed

## 6.0 PRELIMINARY PROJECT IDENTIFICATION

### 6.1 STREAM CROSSINGS

Throughout Vermont, undersized bridges and poorly aligned culverts prevent critical sediment and woody debris transport processes and fish and wildlife migration. These conditions result in 1) channel instability and/or damage to infrastructure and personal property, 2) increased flooding, and 3) decreased fish and wildlife population health. A total of eight (8) culverts at road crossings were assessed using the VTDEC methods. None of the assessed culverts are adequately sized to accommodate stream equilibrium conditions. Five (5) of the assessed culverts have widths less than 50% of bankfull channel width and cause significant flood constrictions and reduced aquatic organism passage (AOP). Three (3) culverts have been identified as “high” priorities for replacement or retrofit to address their incompatibility with channel stability and/or AOP. Detailed summary data for all assessed culverts are included in Appendix B, and key information for each structure is summarized below in Table 6.1.

**Table 6.1** Culverts Assessed on Malletts Creek and Allen (Petty) Brook during Phase 2 Assessments and priority for replacement or retrofit

| Stream Name | Town | Reach/ Segment ID | SGA ID | Road Name | Route Number | % Bankfull Width | AOP Coarse Screen | AOP Geomorphic Compatibility | AOP Retrofit Potential | Overall Priority |
|---|---|---|---|---|---|---|---|---|---|---|
| Malletts Creek Main Stem | Milton | M15 | 100035000004101 | KINGSBURY RD | 35 | 58% | Reduced AOP | Partially Compatible | MML | Moderate |
| | | M17-A | 100005000004101 | EAST RD | 5 | 55% | Reduced AOP | Mostly Compatible | MML | High |
| | | M17-B | 700000000004103 | FOREST RD (PVT) | NA | 48% | Reduced AOP | Mostly Incompatible | MLL | Moderate |
| Allen (Petty) Brook | Colchester | T1.03 | 100010000004051 | COON HILL RD | 10 | 21% | Reduced AOP | Mostly Incompatible | LLL | High |
| | Milton | T1.06-B | 100021000004101 | SWEENY FARM RD | 21 | 33% | Full AOP | Mostly Incompatible | MLL | Moderate |
| | | T1.06-C | 100172000004101 | ALLEN BK DRIVE | 172 | 35% | Full AOP | Partially Compatible | MLL | Low |
| Unnamed Tributary to Malletts Creek | | T6.01-C | 990000000004103 | FARM PATH | 2 | 46% | Reduced AOP | Partially Compatible | MLL | High |
| | | T6.01-C | 100002000004101 | MAIN ST | NA | 74% | Reduced AOP | Mostly Compatible | MML | Low |

| AOP Coarse Screen | | AOP Geomorphic Compatibility | | AOP Retrofit Potential |
|---|---|---|---|---|
| Green | Full AOP for all aquatic organisms | Green | Structure is fully compatible geomorphically 20 < GC < 25 | H: High probability the existing culvert can be retrofitted |
| Gray | Reduced AOP for all aquatic organisms | Light Green | Structure is mostly compatible geomorphically 15 < GC < 20 | M: Medium probability the existing culvert can be retrofitted |
| Orange | No AOP for all aquatic organisms except adult salmonids | Yellow | Structure is partially compatible geomorphically 10 < GC < 15 | L: Low probability the existing culvert can be retrofitted |
| Red | No AOP for all aquatic organisms including adult salmonids | Orange | Structure is mostly incompatible geomorphically 5 < GC < 10 | Position 1 (left): For strong swimmers |
| | | | | Position 2 (Center): For moderate swimmers |
| | | Red | Structure is fully incompatible geomorphically 0 < GC < 5 | Position 3 (right): For weak swimmers |

## 6.2 SITE-SPECIFIC PROJECT OPPORTUNITIES

A list of preliminary, site-level restoration projects for the Malletts Creek and Allen (Petty) Brook study area is provided below in Table 6.2. The project strategy, technical feasibility, and priority for each project are listed by project number and reach/segment. A total of 20 projects were identified to promote the restoration or protection of channel stability and aquatic habitat. The table summarizes key information for each project, including the site stressors and constraints, project strategy, priority, relative costs, and potential partners.

The project locations and categories identified for the study area are included on maps in Appendix C. The 21 projects are further broken down by category as follows: 8 active geomorphic restoration projects; 13 passive geomorphic restoration projects.

**Table 6.2.** Site-specific restoration opportunities

| Stream Name, Reach/Segment, ID #, Location, & Town | Type of Project | Site Description Including Stressors and Constraints | Project or Strategy Description | Hazard Mitigation Priority | Ecological Benefits Priority | Project Benefits | Costs | Potential Partners |
|---|---|---|---|---|---|---|---|---|
| **Malletts Creek M14 #1**<br><br>South of Kingsbury Crossing in beaver swamp<br><br>***Milton*** | Passive Restoration<br><br>*Corridor Protection* | Entire reach is set in a wide valley with much beaver activity. Likelihood of corridor development or encroachment very low due to ponding from beaver dams. | Corridor protection would ensure long-term protection of healthy wildlife habitat in wide stream corridor. | Low | Moderate | Wildlife habitat protection; Long-term protection for flood and sediment storage in corridor. | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Milton |
| **Malletts Creek M15-A #1**<br><br>South of Kingsbury Crossing Road in beaver swamp<br><br>***Milton*** | Passive Restoration<br><br>*Corridor Protection* | Similar to Reach M14. Likelihood of corridor development or encroachment very low due to ponding from beaver dams. | Corridor protection would ensure long-term protection of healthy wildlife habitat in wide stream corridor. | Low | Moderate | Wildlife habitat protection; Long-term protection for flood and sediment storage in corridor. | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Milton |
| **Malletts Creek M15-B #1**<br><br>North and south of Kingsbury Crossing Road<br><br>***Milton*** | Passive Restoration<br><br>*Buffer Plantings; Corridor Conservation* | Significant historical channel straightening. Left (east) corridor from the upstream reach break to the road crossing downstream is used for pasture or hay production. Some bank erosion and channel migration where there is a lack of buffer (and boundary resistance). Approximately 500 feet of the left bank lacks a buffer > 25 feet. | Plant a wider riparian buffer with native woody vegetation in areas lacking canopy cover. Corridor conservation to take some of the pasture and hay out of production and allow the channel to migrate. Corridor conservation will help mitigate with property loss as the channel migrates. | Moderate | Moderate | Reduced thermal loading; Reduced fine sediment loading; Improved biotic habitat within reach; Reduce loss of property. | Low to moderate costs for buffer restoration; moderate to high cost for easements | WNRCD; VTDEC; VRC; Town of Milton; Landowner |
| **Malletts Creek M15-B #2**<br><br>Kingsbury Crossing Road<br><br>***Milton*** | Active Restoration<br><br>*Culvert Retrofit* | The box culvert is "partially compatible" with geomorphic stability, and has "reduced" aquatic organism passage (AOP). The culvert width is 58% of the bankfull channel width. | Culvert appears relatively new, so replacement is unlikely. Retrofit with weirs and baffles within structure bottom to encourage varying velocities and accumulation of native substrate. | Low | Moderate | Improved AOP in reach where high quality habitat was observed upstream. | Low to moderate costs for retrofit. | Town of Milton; VFWD; CCRPC |

**Table 6.2.** Site-specific restoration opportunities

| Stream Name, Reach/Segment, ID #, Location, & Town | Type of Project | Site Description Including Stressors and Constraints | Project or Strategy Description | Hazard Mitigation Priority | Ecological Benefits Priority | Project Benefits | Costs | Potential Partners |
|---|---|---|---|---|---|---|---|---|
| **Malletts Creek M16 #1**<br><br>North of Kingsbury Crossing Road in area of historical beaver activity<br><br>***Milton*** | Passive Restoration<br><br>*Corridor Protection* | Extensive historical beaver activity with some channel incision. Stream corridor natural and not impacted by development. In-stream habitat conditions are "good" and overall wildlife habitat is high quality. | Corridor protection would ensure long-term protection of healthy wildlife habitat in natural stream corridor. | Moderate | Moderate | Wildlife habitat protection; Long-term protection for flood and sediment storage in corridor. | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Milton |
| **Malletts Creek M17-A #1**<br><br>Downstream (west) of East Road crossing<br><br>***Milton*** | Passive Restoration<br><br>*Corridor Protection* | Channel extensively straightened downstream of East Road. Channel may have incised historically but is now aggrading coarse sediment. Lateral channel migration predicted in the future. Corridor vegetation is naturally regenerating into willows, alders, and box elders. | Corridor protection would ensure long-term protection against erosion conflicts as channel migrates laterally. | High | Moderate | Long-term protection for flood and sediment storage in corridor. | Moderate costs for easements. | VTDEC; VRC; Town of Milton |
| **Malletts Creek M17-A #2**<br><br>East Road crossing<br><br>***Milton*** | Active Restoration<br><br>*Culvert Retrofit* | The box culvert is "mostly compatible" with geomorphic stability, but has "reduced" aquatic organism passage (AOP). The culvert width is 55% of the bankfull channel width. | Culvert appears relatively new, so replacement is unlikely. Retrofit with weirs and baffles within structure bottom to encourage varying velocities and accumulation of native substrate. | Low | High | Improved AOP in reach where very high quality habitat was observed upstream. | Low to moderate costs for retrofit. | Town of Milton; VFWD; CCRPC |
| **Malletts Creek M17-B #1**<br><br>East Road upstream to Forest Road<br><br>***Milton*** | Passive Restoration<br><br>*Corridor Protection* | Stream corridor natural with "good" geomorphic stability and aquatic habitat. Numerous brook trout observed in high quality habitat. | Corridor protection would ensure long-term protection of healthy aquatic and wildlife habitat in natural stream corridor. | Low | High | Wildlife habitat protection; Long-term protection for flood and sediment storage in corridor. | Potentially high costs for easements. | VTDEC; VRC; Town of Milton |

**Table 6.2.** Site-specific restoration opportunities

| Stream Name, Reach/Segment, ID #, Location, & Town | Type of Project | Site Description Including Stressors and Constraints | Project or Strategy Description | Hazard Mitigation Priority | Ecological Benefits Priority | Project Benefits | Costs | Potential Partners |
|---|---|---|---|---|---|---|---|---|
| **Malletts Creek M17-B #2**<br><br>Forest Road crossing<br><br>***Milton*** | Active Restoration<br><br>*Culvert Replacement* | Culvert is under private drive. The structure is undersized - width is 48% of the bankfull flow width. The constriction has caused sediment deposition and erosion upstream. Structure is "mostly incompatible" with geomorphic stability and has "reduced" aquatic organism passage (AOP). | Replace the structure with a new culvert that is adequately sized and allows for full AOP. | Moderate | Moderate | Reduced erosion and sediment deposition upstream. | Moderate to high costs for design and installation of new structure | Landowner |
| **Small Tributary to Malletts Creek T6.01 #1**<br><br>Entire reach from Main Street down to confluence with Malletts Creek<br><br>***Milton*** | Passive Restoration<br><br>*Buffer Plantings; Corridor Conservation* | The entire reach has been straightened and lacks native woody vegetation on left (east) bank. Hay production in eastern corridor. Incision is severe in upper segment (C) where erosion is occurring. | A wider riparian buffer should be created by planting native woody species where buffer width is limited. The corridor should be conserved to help mitigate with property loss as the channel migrates laterally in the future. | High | Moderate | Reduced thermal loading; Reduced fine sediment loading; Allow for natural planform development. | Low to moderate costs for buffer restoration; moderate to high cost for easements | WNRCD; VTDEC; VRC; Town of Milton; Landowner |
| **Small Tributary to Malletts Creek T6.01 #2**<br><br>Farm Road crossing west of East Road<br><br>***Milton*** | Active Restoration<br><br>*Culvert Removal* | Culvert is undersized -width is 46% of the bankfull flow width. Culvert is "partially compatible" with geomorphic stability, and has "reduced" aquatic organism passage (AOP). Farm road appears to be used infrequently. | Remove structure. | Moderate | Moderate | Reduced erosion and sediment deposition downstream. | Low costs. | Landowner |
| **Small Tributary to Malletts Creek T6.02 #1**<br><br>Housing development upstream of reach<br><br>***Milton*** | Active Restoration<br><br>*Stormwater Management* | Channel adjustments occurring as a result of increased runoff from upslope residential development. Lack of stormwater controls. Channel has migrated considerably in past 10 years according to landowners. | Review stormwater discharge permit for development to determine compliance. Develop stormwater mitigation strategy. | High | Low | Reduced erosion and property loss in downstream reaches; Reduced sediment loading to Malletts Creek. | Potentially moderate to high costs for design and construction of stormwater BMPs. | VTDEC; Town of Milton; Homeowners Association |

**Table 6.2.** Site-specific restoration opportunities

| Stream Name, Reach/Segment, ID #, Location, & Town | Type of Project | Site Description Including Stressors and Constraints | Project or Strategy Description | Hazard Mitigation Priority | Ecological Benefits Priority | Project Benefits | Costs | Potential Partners |
|---|---|---|---|---|---|---|---|---|
| **Allen (Petty) Brook T1.02 #1**<br><br>East of Route 7<br><br>***Colchester*** | Passive Restoration<br><br>*Corridor Protection* | Straightened historically, however stream corridor currently natural with "good" geomorphic stability. Corridor naturally revegetating with alders, etc. | Corridor protection would ensure long-term protection against erosion conflicts as channel continues to migrate laterally. Flat, developable land may exist in the northern corridor. | Moderate | Low | Long-term protection for flood and sediment storage in corridor; Reduced erosion conflicts; wildlife habitat protection | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Colchester |
| **Allen (Petty) Brook T1.03 #1**<br><br>Downstream (east) of Coon Hill Road<br><br>***Colchester*** | Passive Restoration<br><br>*Corridor Protection* | Straightened historically (~600 feet), with a long stretch (~1000 ft) of north bank lacking a woody buffer > 25 ft. Lateral adjustments predicted in the future. | Corridor protection would ensure long-term protection against erosion conflicts as channel continues to migrate laterally. Flat, developable land may exist in the eastern corridor. | Moderate | Low | Long-term protection for flood and sediment storage in corridor; Reduced erosion conflicts; wildlife habitat protection | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Colchester |
| **Allen (Petty) Brook T1.03 #2**<br><br>Coon Hill Road crossing<br><br>***Colchester*** | Active Restoration<br><br>*Culvert Replacement* | Culvert is undersized -width is 21% of the bankfull flow width. Culvert is "mostly incompatible" with geomorphic stability, and has "reduced" aquatic organism passage (AOP). Significant sediment deposition and erosion upstream and downstream. | Replace the structure with a new culvert that is adequately sized and allows for full AOP. | High | Moderate | Reduced erosion and sediment deposition upstream. | Moderate to high costs for design and installation of new structure. | Town of Colchester; VFWD; CCRPC |
| **Allen (Petty) Brook T1.04 #1**<br><br>East of Route 7<br><br>***Colchester*** | Passive Restoration<br><br>*Corridor Protection* | Straightened historically in some sections, however stream corridor currently natural with "fair" geomorphic stability and habitat. Corridor naturally revegetating with woody species. | Corridor protection would ensure long-term protection against erosion conflicts. There is limited flat, developable land in the stream corridor. | Low | Low | Long-term protection for flood and sediment storage in corridor; Reduced erosion conflicts; wildlife habitat protection | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Colchester |
| **Allen (Petty) Brook T1.04 #2**<br><br>Housing development along Route 7<br><br>***Colchester*** | Active Restoration<br><br>*Stormwater Management* | Gully formed along steep side slope down gradient of outfall of stormwater pond serving upslope residential development. Gully is eroding beneath stone-lined ditch delivering sediment to channel and is migrating upslope to the west. | Stabilize gully near the outfall to Allen Brook with additional stone. Current diameter of stone in channel inadequate to control erosion. | High | Low | Reduced erosion and property loss; Reduced sediment loading to Allen Brook. | Low to moderate costs for stabilization. | VTDEC; Town of Colchester; Homeowners Association |

**Table 6.2.** Site-specific restoration opportunities

| Stream Name, Reach/Segment, ID #, Location, & Town | Type of Project | Site Description Including Stressors and Constraints | Project or Strategy Description | Hazard Mitigation Priority | Ecological Benefits Priority | Project Benefits | Costs | Potential Partners |
|---|---|---|---|---|---|---|---|---|
| **Allen (Petty) Brook T1.05 & T1.06-A #1**<br><br>East of Route 7<br><br>***Colchester/Milton*** | Passive Restoration<br><br>*Corridor Protection* | Both segments have natural corridors with no major impacts. Floodplain functions and aquatic habitat are excellent. | Corridor protection would ensure long-term conservation of high quality stream corridor and habitat. | Low | High | Long-term protection for flood and sediment storage in corridor; wildlife habitat protection | Potentially moderate to high costs for easements. | VTDEC; VRC; Town of Milton; Town of Colchester |
| **Allen (Petty) Brook T1.06-B #1**<br><br>Sweeny Farm Road crossing<br><br>***Milton*** | Active Restoration<br><br>*Culvert Replacement* | Culvert is undersized -width is 33% of the bankfull flow width. Culvert is "mostly incompatible" with geomorphic stability. Significant sediment deposition and erosion upstream and downstream. | Replace the structure with a new culvert that is adequately sized. | Moderate | Moderate | Reduced erosion and sediment deposition upstream. | Moderate to high costs for design and installation of new structure. | Town of Milton; CCRPC |
| **Allen (Petty) Brook T1.06-B #2**<br><br>Downstream (South) of Sweeny Farm Road<br><br>***Milton*** | Passive Restoration<br><br>*Buffer Management* | Approximately 500 feet of the channel is managed as a hay field on both banks. Natural revegetation is occurring along the near bank. | Work with landowner to stop haying within 25 feet of the channel and allow for natural revegetation. | Low | Moderate | Reduced thermal loading; Reduced fine sediment loading; Improved biotic habitat within reach | Low to moderate costs for buffer restoration | VTDEC; Landowner |
| **Allen (Petty) Brook T1.06-C #1**<br><br>Downstream (south) of Allen Brook Drive<br><br>***Milton*** | Passive Restoration<br><br>*Buffer Plantings* | The left (eastern) bank of the channel downstream of the culvert lacks woody buffer vegetation for 300 feet. The buffer may be managed as a hay field; woody species are limited. | A wider buffer should be created. Planting woody species in the 300 foot stretch of bank would improve the bank stability and provide more floodplain roughness and shading. | Low | Moderate | Reduced thermal loading; Reduced fine sediment loading; Improved biotic habitat within reach | Low to moderate costs for buffer restoration | WNRCD; LCBP; Landowner |

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

The following are some of the key conclusions and recommendations from this work that will help the CCRPC, the Towns of Milton and Colchester, and VTDEC look forward to additional data collection and restoration planning in the watershed.

- The majority of the watershed land use is comprised of forested land (57.8%) and agricultural land (24.6%). The current land use represents a shift in land use over the last 70 years from a watershed that was once predominately agricultural lands and much less forested. Although the land use has shifted away from agriculture, extensive impacts to the natural channel condition still remain from past land use. Channel straightening is very common in much of the upper Malletts Creek and Allen Brook watershed; over 37% of the reaches have high impact from straightening.

- The watershed has seen an increase in new development pressure over the last 50 years as well as more recent development over the last 10-15 years. Developed land, which occupies 7.2% of the watershed, is most commonly found as low density residential areas. Some higher density industrial and commercial development in Milton between Route 7 and Interstate 89 has taken place. Areas of high density residential development have also taken place in the upper Malletts Creek watershed (e.g., the Hunting Ridge Lane development). Finally, many single family residences have been built on the tops of valley side slopes in close proximity to the stream. Although much of these parcels seem like prime locations for residencies, they could present a hazard if fluvial-induced slope failures occur in the erodible channel margins.

- The soils in the watershed are predominately hydrologic group D-type, which are poor-draining clay soils deposited during the post-glacial lake periods of the Champlain Basin. The hydric soils are usually found as wetlands which occupy a large portion of the Malletts Creek and Allen Brook valleys. Many of these valleys have not been impacted extensively and should be considered for conservation.

- Bridges and culverts were commonly undersized and often had large scour pools downstream of the outlet. The culvert beneath Coon Hill Road in Colchester is causing significant channel instability and is a high priority for replacement. In addition to the Phase 2 assessed structures, additional structures should be assessed throughout the Phase 1 assessment area to ensure no further erosion hazards could result from poorly sized culverts and bridges.

- Impacts to other tributary surface waters in Milton that were not included in this Phase 1 assessment were observed in the field. These tributaries, T3 (draining Beaverbrook residential area) and T5 (along Devino Road), should be considered for additional Phase 1 efforts to determine how watershed and reach-scale stressors have impacted their condition.

- The small tributary entering Malletts Creek from the north in Milton (T6) is unstable in two locations: 1) south of Main Street crossing where the channel was historically straightened and is severely incised (segment T6.01-C); 2) north of Main Street crossing where increased runoff from an upslope residential development is causing channel migration (Reach T6.02). Better stormwater management in the upslope area is highly recommended, and corridor conservation in the lower segment should also be considered.

- Near the Colchester-Milton town line, Allen Brook flows through a nearly pristine area of corridor where stability and habitat was observed in excellent conditions. This area represents a high priority conservation area for protecting intact wildlife habitat, including “reference” aquatic habitat.

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# APPENDIX A
## PHASE 1 REACH SUMMARY REPORTS

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M01**
SGAT Version: **4.56**
Date Last Edited: **August, 06 2010**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Reach is technically part of Lake Champlain, used to connect Malletts Creek and Allen (Petty) Brook.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5749126156**

1.3 Downstream Longitude: **-73.1747553596**

Step 2. Stream Type

2.1 Elevation Upstream: **98**
2.1 Elevation Downstream: **98**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **560.0** ft. **0.11** Miles
2.3 Valley Slope: **0.0**
2.4 Channel Length: **645.7** ft. **0.12** Miles
2.5 Channel Slope: **0.02 %**
2.6 Sinuosity: **1.15**
2.7 Watershed Area: **29.1** Square Miles
2.8 Channel Width: **57.7** feet
2.9 Valley Width: **386.0** feet
2.10 Confinement Ratio: **6.7**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **100.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Flat**
3.4 Valley Slope Right: **Flat**
3.5 Soils
Hydrologic Group: **C** **100.0** %
Flooding: **Frequent** **100.0** %
Water Table Deep: **1.5** **100.0** %
Water Table Shallow: **0.0** **100.0** %
Erodibility: **0.0** %
7.4 Comments:

**Reach is technically Lake Champlain and used to connect Malletts Creek and Allen Brook which both flow into the lake in the same area.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Wetland**
Current Dominant Land Cover: **Forest** **48.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
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: | **None** | **None** |
| Length w / less than 25 ft.: | ft. | ft. |

4.4 Ground Water Inputs: **Abundant**

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

Step 6. Floodplain Modifications
6.1 Berms & 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: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey
7.1 Bank Erosion: **0** ft
7.2 Bank Height: **0** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 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/A | 0 N/A | 0 N.S. | 0 N.S. | 2 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Begins at the mouth of the creek with Lake Champlain in large wetland area and ends at confluence with Pond Brook.**

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5739488958**

1.3 Downstream Longitude: **-73.1730038713**

Step 2. Stream Type

2.1 Elevation Upstream: **99**
2.1 Elevation Downstream: **98**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **4,349.5** ft. **0.82** Miles
2.3 Valley Slope: **0.0**
2.4 Channel Length: **4,779.8** ft. **0.91** Miles
2.5 Channel Slope: **0.02 %**
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **23.6** Square Miles
2.8 Channel Width: **52.7** feet
2.9 Valley Width: **662.5** feet
2.10 Confinement Ratio: **12.6**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **96.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Flat**
3.4 Valley Slope Right: **Flat**
3.5 Soils
Hydrologic Group: **C** **96.0** %
Flooding: **Frequent** **96.0** %
Water Table Deep: **1.5** **96.0** %
Water Table Shallow: **0.0** **100.0** %
Erodibility: **slight** **3.0** %
7.4 Comments:

**Water elevation in the lower portion of the reach is controlled by the lake level and a wetland complex. Area likely to be segmented out if Phase 2 assessments considered.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Wetland**
Current Dominant Land Cover: **Forest** **52.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Wetland** **55.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **26-50** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **864.4** **18.1** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **128 ft.** Rato: **2.4**
6.6 Wavelength: **438 ft.** Ratio: **8.3**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 0 N.S. | 0 N.S. | 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 | 0 N.S. | 0 N.S. | 0 N.S. | 6 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M03**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From Pond Brook confluence to about 2,600 feet upstream of Route 7 crossing.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5676347488**

1.3 Downstream Longitude: **-73.163429791**

Step 2. Stream Type

2.1 Elevation Upstream: **106**
2.1 Elevation Downstream: **99**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **4,064.5** ft. **0.77** Miles
2.3 Valley Slope: **0.2**
2.4 Channel Length: **5,025.0** ft. **0.95** Miles
2.5 Channel Slope: **0.14 %**
2.6 Sinuosity: **1.24**
2.7 Watershed Area: **19.0** Square Miles
2.8 Channel Width: **47.9** feet
2.9 Valley Width: **1,296.5** feet
2.10 Confinement Ratio: **27.1**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **81.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **C** **61.0** %
Flooding: **Frequent** **61.0** %
Water Table Deep: **1.5** **61.0** %
Water Table Shallow: **0.0** **61.0** %
Erodibility: **slight** **13.0** %

7.4 Comments:

**Multiple debris jams and low bridge clearance makes debris/ice jam potential a minor impact. The corridor in downstream of Route 7 does not seem to be used as hay fields and preserved as wetlands, Upstream the same should be considered.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **53.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **42.0** %
Current Sub-Dominant Land Cover: **Wetland**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **26-50** |
| Sub-dominant: | **51-100** | **>100** |
| Length w / less than 25 ft.: | **0.0** ft. | **1,138.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.8** %
5.3 Bank Armoring: **33.7** **0.7** %
Left: **0.0** ft. Right: **33.7** ft.
5.4 Channel Straightening: **501.5** **10.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **135 ft.** Ratio: **2.8**
6.6 Wavelength: **298 ft.** Ratio: **6.2**

Step 7. Windshield Survey

7.1 Bank Erosion: **78.02** ft
7.2 Bank Height: **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 | 7.3 | 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 | 1 Low | 0 N.S. | 1 Low | 12 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M04**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From reach break at slope and confinement change to approximately 750 feet downstream of Middle Road crossing.**

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5691026121**

1.3 Downstream Longitude: **-73.1502948477**

Step 2. Stream Type

2.1 Elevation Upstream: **178**
2.1 Elevation Downstream: **106**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,561.5** ft. **0.49** Miles
2.3 Valley Slope: **2.8**
2.4 Channel Length: **2,906.7** ft. **0.55** Miles
2.5 Channel Slope: **2.48 %**
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **18.5** Square Miles
2.8 Channel Width: **47.3** feet
2.9 Valley Width: **111.5** feet
2.10 Confinement Ratio: **2.4**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Step-Pool**
Sub-Class Slope: **None**
Bed Material: **Cobble**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geological Mat.: **Glacial Lake** **73.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **Not Rated** **49.0** %
Flooding: **None/Rare** **80.0** %
Water Table Deep: **1.5** **19.0** %
Water Table Shallow: **0.0** **19.0** %
Erodibility: **slight** **13.0** %
7.4 Comments:

**Grade control suspected in lower reach where extreme elevation change noted on the LiDAR data.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **53.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 1 Low | 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. | 3 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M05**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From reach break downstream of Middle Rd to change in slope and confinement along Middle Rd.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5698696744**

1.3 Downstream Longitude: **-73.1437453687**

Step 2. Stream Type

2.1 Elevation Upstream: **184**
2.1 Elevation Downstream: **178**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,946.5** ft. **0.56** Miles
2.3 Valley Slope: **0.2**
2.4 Channel Length: **3,588.6** ft. **0.68** Miles
2.5 Channel Slope: **0.17 %**
2.6 Sinuosity: **1.22**
2.7 Watershed Area: **17.3** Square Miles
2.8 Channel Width: **46.0** feet
2.9 Valley Width: **314.5** feet
2.10 Confinement Ratio: **6.8**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **69.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **40.0** %
Flooding: **Frequent** **40.0** %
Water Table Deep: **1.5** **40.0** %
Water Table Shallow: **0.0** **45.0** %
Erodibility: **slight** **10.0** %

7.4 Comments:
**Reach has had historical channel straightening and has a long ditch dug at the west valley toe.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **55.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **30.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **26-50** | **0-25** |
| Length w / less than 25 ft.: | **0.0** ft. | **831.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.9** %
5.3 Bank Armoring: **55.0** **1.5** %
Left: **40.5** ft. Right: **14.6** ft.
5.4 Channel Straightening: **564.9** **15.7** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **119 ft.** Rato: **2.6**
6.6 Wavelength: **262 ft.** Ratio: **5.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **71.29** ft
7.2 Bank Height: **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 | 7.3 | 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. | 2 High | 2 High | 2 High | 0 N.S. | 1 Low | 14 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M06**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Short reach in confined section.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5719656065**
1.3 Downstream Longitude: **-73.1390803704**

Step 2. Stream Type

2.1 Elevation Upstream: **214**
2.1 Elevation Downstream: **184**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,010.5** ft. **0.19** Miles
2.3 Valley Slope: **3.0**
2.4 Channel Length: **1,048.9** ft. **0.20** Miles
2.5 Channel Slope: **2.86 %**
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **17.0** Square Miles
2.8 Channel Width: **45.5** feet
2.9 Valley Width: **109.5** feet
2.10 Confinement Ratio: **2.4**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Cobble**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **54.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **D** **54.0** %
Flooding: **None/Rare** **99.0** %
Water Table Deep: **6.0** **54.0** %
Water Table Shallow: **6.0** **54.0** %
Erodibility: **Severe** **54.0** %
7.4 Comments:
**Short reach with coarser substrate and steeper slope.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
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: | **0-25** | **0-25** |
| Length w / less than 25 ft.: | **84.0** ft. | **56.0** ft. |

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 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. | 0 N.S. | 4 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M07**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From reach break at confinement change to large meander south of Austin House Road.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5740900676**

1.3 Downstream Longitude: **-73.1391030932**

Step 2. Stream Type

2.1 Elevation Upstream: **224**
2.1 Elevation Downstream: **214**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,940.0** ft. **0.37** Miles
2.3 Valley Slope: **0.5**
2.4 Channel Length: **3,080.4** ft. **0.58** Miles
2.5 Channel Slope: **0.32 %**
2.6 Sinuosity: **1.59**
2.7 Watershed Area: **16.9** Square Miles
2.8 Channel Width: **45.5** feet
2.9 Valley Width: **364.0** feet
2.10 Confinement Ratio: **8.0**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **76.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **B** **65.0** %
Flooding: **Occasional** **65.0** %
Water Table Deep: **3.0** **65.0** %
Water Table Shallow: **1.5** **65.0** %
Erodibility: **slight** **17.0** %
7.4 Comments:

**Reach has had large amounts of straightening and low buffer width. Great opportunities for restoration on this reach.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **54.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **26.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **0-25** |
| Sub-dominant: | **0-25** | **>100** |
| Length w / less than 25 ft.: | **1,056.0** ft. | **2,640.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **1,334.8** **43.3** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **96 ft.** Ratio: **2.1**
6.6 Wavelength: **188 ft.** Ratio: **4.1**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 14 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M08**
SGAT Version: **4.56**
Date Last Edited: **August, 05 2010**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From change in confinement at reach break to about 1,500 feet downstream of the East Road Crossing.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5787314926**

1.3 Downstream Longitude: **-73.1353778712**

Step 2. Stream Type

2.1 Elevation Upstream: **244**
2.1 Elevation Downstream: **224**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,713.0** ft. **0.32** Miles
2.3 Valley Slope: **1.2**
2.4 Channel Length: **2,147.9** ft. **0.41** Miles
2.5 Channel Slope: **0.93 %**
2.6 Sinuosity: **1.25**
2.7 Watershed Area: **16.8** Square Miles
2.8 Channel Width: **45.3** feet
2.9 Valley Width: **192.0** feet
2.10 Confinement Ratio: **4.2**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **57.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **79.0** %
Flooding: **None/Rare** **75.0** %
Water Table Deep: **2.5** **54.0** %
Water Table Shallow: **1.5** **54.0** %
Erodibility: **Severe** **57.0** %
7.4 Comments:

**Coarser substrate and higher slope noted using the high resolution aerial photographs.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **55.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **31.0** %
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.: | ft. | ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **Point**
6.4 Meander Migration: **None**
6.5 Meander Width: **113 ft.** Ratio: **2.5**
6.6 Wavelength: **361 ft.** Ratio: **8.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **0** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 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. | 2 High | 1 Low | 0 N.S. | 0 N.S. | 7 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **COLCHESTER, ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M09**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Long reach in unconfined setting. Extends from downstream of East Road to confluence with T3.01, Beaver Brook.**

1.2 Towns: **Colchester, Milton**

1.3 Downstream Latitude: **44.578777745**
1.3 Downstream Longitude: **-73.129421138**

Step 2. Stream Type

2.1 Elevation Upstream: **262**
2.1 Elevation Downstream: **244**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **6,422.5** ft. **1.22** Miles
2.3 Valley Slope: **0.3**
2.4 Channel Length: **9,573.7** ft. **1.81** Miles
2.5 Channel Slope: **0.19 %**
2.6 Sinuosity: **1.49**
2.7 Watershed Area: **16.5** Square Miles
2.8 Channel Width: **45.0** feet
2.9 Valley Width: **313.5** feet
2.10 Confinement Ratio: **7.0**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **77.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **C** **45.0** %
Flooding: **Frequent** **41.0** %
Water Table Deep: **1.5** **41.0** %
Water Table Shallow: **0.0** **47.0** %
Erodibility: **slight** **10.0** %

7.4 Comments:
**Long reach has considerable beaver activity given the low slope and wide valley setting. Downstream of the East Rd crossing a large pool exists due to culvert alignment issues. Upstream of the crossing buffer width issues could be resolved.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Forest** **25.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **51-100** | **51-100** |
| Sub-dominant: | **>100** | **>100** |
| Length w / less than 25 ft.: | **854.0** ft. | **104.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **0.7** %
5.3 Bank Armoring: **73.3** **0.8** %
Left: **0.0** ft. Right: **73.3** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **1,837.0** ft. **19.2**

| | One Side | Both Sides |
|---|---|---|
| Road: | **1,837.0** 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: **1,073.1** ft. **0.0** ft.
6.3 Channel Bars: **Point**
6.4 Meander Migration: **Neck Cutoff**
6.5 Meander Width: **146 ft.** Ratio: **3.2**
6.6 Wavelength: **197 ft.** Ratio: **4.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 1 Low | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 1 Low | 1 Low | 0 N.S. | 1 Low | 1 Low | 2 High | 0 N.S. | 1 Low | 12 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M10**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From confluence with T3 to reach break just upstream of railroad crossing at the confluence with T4.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.592507909**

1.3 Downstream Longitude: **-73.1196162772**

Step 2. Stream Type

2.1 Elevation Upstream: **264**
2.1 Elevation Downstream: **262**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,661.5** ft. **0.31** Miles
2.3 Valley Slope: **0.1**
2.4 Channel Length: **2,326.4** ft. **0.44** Miles
2.5 Channel Slope: **0.09 %**
2.6 Sinuosity: **1.40**
2.7 Watershed Area: **12.9** Square Miles
2.8 Channel Width: **40.3** feet
2.9 Valley Width: **374.5** feet
2.10 Confinement Ratio: **9.3**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **59.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Flat**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **59.0** %
Flooding: **Frequent** **59.0** %
Water Table Deep: **1.5** **59.0** %
Water Table Shallow: **0.0** **75.0** %
Erodibility: **Moderate** **29.0** %

7.4 Comments:

**Channel has extensive encroachments/straightening from the adjacent railroad. Buffer width issues are also present and conservation of the right floodplain should be considered.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Wetland**
Current Dominant Land Cover: **Forest** **64.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **35.0** %
Current Sub-Dominant Land Cover: **Wetland**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **51-100** |
| Sub-dominant: | **51-100** | **>100** |
| Length w / less than 25 ft.: | **605.0** ft. | **335.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.6** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **1,021.9** **43.9** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **1,901.5** ft. **81.7**

| | One Side | Both Sides |
|---|---|---|
| Road: | **0.0** ft. | **0.0** ft. |
| Railroad: | **1,901.5** 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: **Neck Cutoff**
6.5 Meander Width: **83 ft.** Ratio: **2.1**
6.6 Wavelength: **178 ft.** Ratio: **4.4**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 0 N.S. | 2 High | 0 N.S. | 0 N.S. | 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 16 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M11**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From confluence with T4 up to change in floodplain encroachments west of East Rd.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.5959254005**

1.3 Downstream Longitude: **-73.1165293**

Step 2. Stream Type

| | | | |
|---|---|---|---|
| 2.1 Elevation Upstream: | **273** | | |
| 2.1 Elevation Downstream: | **264** | | |
| 2.1 Is Gradient Gentle?: | **No** | | |
| 2.2 Valley Length: | **3,091.5** ft. | **0.59** | Miles |
| 2.3 Valley Slope: | **0.3** | | |
| 2.4 Channel Length: | **5,685.5** ft. | **1.08** | Miles |
| 2.5 Channel Slope: | **0.16 %** | | |
| 2.6 Sinuosity: | **1.84** | | |
| 2.7 Watershed Area: | **7.0** Square Miles | | |
| 2.8 Channel Width: | **30.9** feet | | |
| 2.9 Valley Width: | **889.5** feet | | |
| 2.10 Confinement Ratio: | **28.8** | | |
| 2.10 Confinement Type: | **Very Broad** | | |
| 2.11 Reference Stream Type: | **E** | | |
| Bedform: | **Dune-Ripple** | | |
| Sub-Class Slope: | **None** | | |
| Bed Material: | **Sand** | | |

Step 3. Basin Charateristicts

| | | |
|---|---|---|
| 3.1 Alluvial Fan: | **None** | |
| 3.2 Grade Control: | **None** | |
| 3.3 Dominant Geological Mat.: | **Alluvial** | **85.0** % |
| 3.3 Sub-dom. Geological Mat.: | **Glacial Lake** | |
| 3.4 Valley Slope Left: | **Flat** | |
| 3.4 Valley Slope Right: | **Flat** | |
| 3.5 Soils | | |
| Hydrologic Group: | **B** | **64.0** % |
| Flooding: | **Occasional** | **64.0** % |
| Water Table Deep: | **3.0** | **64.0** % |
| Water Table Shallow: | **1.5** | **67.0** % |
| Erodibility: | **slight** | **7.0** % |

7.4 Comments:

**Valley is very wide in large wetland complex. The road and the railroad are outside of the corridor on the left and right sides, respectively. The railroad has likely cut off connectivity to an even larger wetland complex to the west.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

| | | |
|---|---|---|
| Historic Land Cover: | **Field** | |
| Current Dominant Land Cover: | **Forest** | **60.0** % |
| Current Sub-Dominant Land Cover: | **Crop** | |

4.2 Corridor

| | | |
|---|---|---|
| Historic Land Cover:: | **Wetland** | |
| Current Dominant Land Cover: | **Forest** | **46.0** % |
| Current Sub-Dominant Land Cover: | **Wetland** | |

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **51-100** |
| Length w / less than 25 ft.: | **1,141.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

| | | | |
|---|---|---|---|
| 6.1 Berms & Roads - old: | **928.9** ft. | **16.3** | |
| | One Side | Both Sides | |
| Road: | **928.9** 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: | **Flood Chute** | | |
| 6.5 Meander Width: | **109 ft.** Ratio: | **3.5** | |
| 6.6 Wavelength: | **148 ft.** Ratio: | **4.8** | |

Step 7. Windshield Survey

| | | |
|---|---|---|
| 7.1 Bank Erosion: | **0** | ft |
| 7.2 Bank Height: | **No Data** | 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 | 7.3 | 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. | 2 High | 1 Low | 2 High | 0 N.S. | 0 N.S. | 12 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M12**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break west of East Road to about 1,600 feet upstream of the McMullen Culvert crossing.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6025583309**

1.3 Downstream Longitude: **-73.1100810792**

Step 2. Stream Type

2.1 Elevation Upstream: **282**
2.1 Elevation Downstream: **273**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **3,626.0** ft. **0.69** Miles
2.3 Valley Slope: **0.2**
2.4 Channel Length: **5,447.2** ft. **1.03** Miles
2.5 Channel Slope: **0.17 %**
2.6 Sinuosity: **1.50**
2.7 Watershed Area: **6.9** Square Miles
2.8 Channel Width: **30.7** feet
2.9 Valley Width: **600.0** feet
2.10 Confinement Ratio: **19.6**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **53.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **B** **65.0** %
Flooding: **Occasional** **53.0** %
Water Table Deep: **3.0** **65.0** %
Water Table Shallow: **1.5** **69.0** %
Erodibility: **Moderate** **45.0** %
7.4 Comments:

**Culvert has beaver activity immediately upstream and significant debris which may be problematic during high flows or during ice flows. Channel has good meandering profile with only some buffer issues.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **60.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **23.0** %
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.: | **1,226.0** ft. | **319.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **1.3** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **386.0** ft. **7.1**

| | 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: | **386.0** 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: **88 ft.** Ratio: **2.9**
6.6 Wavelength: **180 ft.** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 2 High | 2 High | 2 High | 0 N.S. | 1 Low | 14 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M13**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From just upstream of M12 subtributary to area where valley widens considerably.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6111236005**

1.3 Downstream Longitude: **-73.1047564**

Step 2. Stream Type

| | | | |
|---|---|---|---|
| 2.1 Elevation Upstream: | **293** | | |
| 2.1 Elevation Downstream: | **282** | | |
| 2.1 Is Gradient Gentle?: | **No** | | |
| 2.2 Valley Length: | **2,261.0** ft. | **0.43** | Miles |
| 2.3 Valley Slope: | **0.5** | | |
| 2.4 Channel Length: | **3,928.9** ft. | **0.74** | Miles |
| 2.5 Channel Slope: | **0.28 %** | | |
| 2.6 Sinuosity: | **1.74** | | |
| 2.7 Watershed Area: | **6.2** Square Miles | | |
| 2.8 Channel Width: | **29.2** feet | | |
| 2.9 Valley Width: | **339.0** feet | | |
| 2.10 Confinement Ratio: | **11.6** | | |
| 2.10 Confinement Type: | **Very Broad** | | |
| 2.11 Reference Stream Type: | **E** | | |
| Bedform: | **Dune-Ripple** | | |
| Sub-Class Slope: | **None** | | |
| Bed Material: | **Sand** | | |

Step 3. Basin Charateristicts

| | | |
|---|---|---|
| 3.1 Alluvial Fan: | **None** | |
| 3.2 Grade Control: | **None** | |
| 3.3 Dominant Geological Mat.: | **Alluvial** | **85.0** % |
| 3.3 Sub-dom. Geological Mat.: | **Ice-Contact** | |
| 3.4 Valley Slope Left: | **Very Steep** | |
| 3.4 Valley Slope Right: | **Ext. Steep** | |
| 3.5 Soils | | |
| Hydrologic Group: | **C** | **85.0** % |
| Flooding: | **Frequent** | **85.0** % |
| Water Table Deep: | **1.5** | **85.0** % |
| Water Table Shallow: | **0.0** | **85.0** % |
| Erodibility: | **slight** | **12.0** % |

7.4 Comments:

**The primary channel is accompanied by many smaller channels that weave through a well-vegetated wetland area.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

| | | |
|---|---|---|
| Historic Land Cover: | **Field** | |
| Current Dominant Land Cover: | **Forest** | **61.0** % |
| Current Sub-Dominant Land Cover: | **Crop** | |

4.2 Corridor

| | | |
|---|---|---|
| Historic Land Cover:: | **Wetland** | |
| Current Dominant Land Cover: | **Forest** | **40.0** % |
| 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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

| | | | |
|---|---|---|---|
| 6.1 Berms & 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: | **Multiple** | | |
| 6.5 Meander Width: | **81 ft.** Ratio: | **2.8** | |
| 6.6 Wavelength: | **138 ft.** Ratio: | **4.7** | |

Step 7. Windshield Survey

| | | |
|---|---|---|
| 7.1 Bank Erosion: | **0** | ft |
| 7.2 Bank Height: | **No Data** | 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 1 Low | 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. | 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 9 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M14**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Area of very broad valley up to confluence with T5.02, Hardscrabble Brook.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6172945005**

1.3 Downstream Longitude: **-73.1054298**

Step 2. Stream Type

| | | | |
|---|---|---|---|
| 2.1 Elevation Upstream: | **302** | | |
| 2.1 Elevation Downstream: | **293** | | |
| 2.1 Is Gradient Gentle?: | **No** | | |
| 2.2 Valley Length: | **1,893.0** ft. | **0.36** | Miles |
| 2.3 Valley Slope: | **0.4** | | |
| 2.4 Channel Length: | **2,779.4** ft. | **0.53** | Miles |
| 2.5 Channel Slope: | **0.31 %** | | |
| 2.6 Sinuosity: | **1.47** | | |
| 2.7 Watershed Area: | **5.8** Square Miles | | |
| 2.8 Channel Width: | **28.3** feet | | |
| 2.9 Valley Width: | **783.0** feet | | |
| 2.10 Confinement Ratio: | **27.6** | | |
| 2.10 Confinement Type: | **Very Broad** | | |
| 2.11 Reference Stream Type: | **E** | | |
| Bedform: | **Dune-Ripple** | | |
| Sub-Class Slope: | **None** | | |
| Bed Material: | **Sand** | | |

Step 3. Basin Charateristicts

| | | |
|---|---|---|
| 3.1 Alluvial Fan: | **None** | |
| 3.2 Grade Control: | **None** | |
| 3.3 Dominant Geological Mat.: | **Alluvial** | **99.0** % |
| 3.3 Sub-dom. Geological Mat.: | **Glacial Lake** | |
| 3.4 Valley Slope Left: | **Steep** | |
| 3.4 Valley Slope Right: | **Very Steep** | |
| 3.5 Soils | | |
| Hydrologic Group: | **C** | **75.0** % |
| Flooding: | **Frequent** | **75.0** % |
| Water Table Deep: | **1.5** | **75.0** % |
| Water Table Shallow: | **0.0** | **75.0** % |
| Erodibility: | | **0.0** % |

7.4 Comments:

**The channel has had some evidence of straightening in the upper reach. a large wetland area with a broad valley exists mid-reach.**

**Reach M14 was segmented into 2 segments M14-A (261ft) and M14-B (2,518ft). Segmentation was done in order to distinguish the large portion of the reach (Segment B) that was impacted by beaver activity and impounded. Segment M14-A was in good condition and had morphology**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

| | | |
|---|---|---|
| Historic Land Cover: | **Field** | |
| Current Dominant Land Cover: | **Forest** | **62.0** % |
| Current Sub-Dominant Land Cover: | **Crop** | |

4.2 Corridor

| | | |
|---|---|---|
| Historic Land Cover:: | **Field** | |
| Current Dominant Land Cover: | **Crop** | **47.0** % |
| Current Sub-Dominant Land Cover: | **Wetland** | |

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

| | | | |
|---|---|---|---|
| 5.1 Flow Regulation - (old): | **None** | | |
| Type: | **None** | | |
| Use: | | | |
| 5.2 Bridges and Culverts: | **0** | **0.0** % | |
| 5.3 Bank Armoring: | **0.0** | **0.0** % | |
| Left: | **0.0** ft. | Right: | **0.0** ft. |
| 5.4 Channel Straightening: | **407.6** | **14.7** % | |
| 5.5 Dredging History: | **None** | | |

Step 6. Floodplain Modifications

| | | | |
|---|---|---|---|
| 6.1 Berms & 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: | **Multiple** | | |
| 6.5 Meander Width: | **49 ft.** Ratio: | **1.7** | |
| 6.6 Wavelength: | **110 ft.** Ratio: | **3.9** | |

Step 7. Windshield Survey

| | | |
|---|---|---|
| 7.1 Bank Erosion: | **0** | ft |
| 7.2 Bank Height: | **No Data** | 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 0 N.S. | 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. | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **ESSEX CENTER, MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M15**
SGAT Version: **4.56**
Date Last Edited: **February, 21 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Reach begins at confluence with T5 and extends to approximately 1,000 feet upstream of Kingsbury Road Crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6216653267**

1.3 Downstream Longitude: **-73.1074142121**

Step 2. Stream Type

2.1 Elevation Upstream: **309**
2.1 Elevation Downstream: **302**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,910.5** ft. **0.36** Miles
2.3 Valley Slope: **0.4**
2.4 Channel Length: **2,157.7** ft. **0.41** Miles
2.5 Channel Slope: **0.35 %**
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **4.0** Square Miles
2.8 Channel Width: **24.1** feet
2.9 Valley Width: **350.5** feet
2.10 Confinement Ratio: **14.5**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **81.0** %
3.3 Sub-dom. Geological Mat.: **Other**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **78.0** %
Flooding: **Frequent** **78.0** %
Water Table Deep: **1.5** **78.0** %
Water Table Shallow: **0.0** **78.0** %
Erodibility: **0.0** %
7.4 Comments:

**Culvert observed mid-reach was recently replaced and has lower likelihood of future problems. However, previous culvert might have help contribute coarse road materials into the stream.**

**Reach M15 was segmented into 2 segments M15-A (671ft) and M15-B (1,487ft). Segmentation was done in order to distinguish the area of the reach (Segment A) that was impacted by beaver activity and impounded.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **63.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **42.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **None** |
| Length w / less than 25 ft.: | **463.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.4** %
5.3 Bank Armoring: **45.8** **2.1** %
Left: **22.5** ft. Right: **23.3** ft.
5.4 Channel Straightening: **1,449.8** **67.2** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **53 ft.** Ratio: **2.2**
6.6 Wavelength: **111 ft.** Ratio: **4.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **149.5** ft
7.2 Bank Height: **3** 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 | 7.3 | 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. | 1 Low | 1 Low | 2 High | 2 High | 1 Low | 0 N.S. | 15 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M16**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From reach break up to confluence with T6.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6256755202**

1.3 Downstream Longitude: **-73.1040082881**

Step 2. Stream Type

2.1 Elevation Upstream: **333**
2.1 Elevation Downstream: **309**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,277.0** ft. **0.43** Miles
2.3 Valley Slope: **1.0**
2.4 Channel Length: **3,142.5** ft. **0.60** Miles
2.5 Channel Slope: **0.75 %**
2.6 Sinuosity: **1.38**
2.7 Watershed Area: **3.9** Square Miles
2.8 Channel Width: **23.9** feet
2.9 Valley Width: **248.0** feet
2.10 Confinement Ratio: **10.4**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **81.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **86.0** %
Flooding: **Frequent** **81.0** %
Water Table Deep: **1.5** **81.0** %
Water Table Shallow: **0.0** **81.0** %
Erodibility: **slight** **11.0** %

7.4 Comments:
**Several ditched tributary drainages enter the channel from the farm field to the east.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **64.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **50.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **None** |
| Length w / less than 25 ft.: | **320.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **99 ft.** Rato: **4.1**
6.6 Wavelength: **72 ft.** Ratio: **3.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **525.12** ft
7.2 Bank Height: **3** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 1 Low | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 0 Unk. | 0 N.S. | 2 High | 1 Low | 1 Low | 2 High | 1 Low | 0 N.S. | 12 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M16-S1.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Short sub-tributary that extends to the east beyond East Rd.**

1.1 Reach Description:
1.2 Towns: **Milton**
1.3 Downstream Latitude: **44.6297383066**
1.3 Downstream Longitude: **-73.1031147133**

Step 2. Stream Type

2.1 Elevation Upstream: **513**
2.1 Elevation Downstream: **324**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,423.0** ft. **0.46** Miles
2.3 Valley Slope: **7.8**
2.4 Channel Length: **2,568.2** ft. **0.49** Miles
2.5 Channel Slope: **7.36 %**
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **0.2** Square Miles
2.8 Channel Width: **5.9** feet
2.9 Valley Width: **18.0** feet
2.10 Confinement Ratio: **3.1**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **65.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **D** **42.0** %
Flooding: **None/Rare** **99.0** %
Water Table Deep: **2.0** **42.0** %
Water Table Shallow: **0.0** **43.0** %
Erodibility: **Very Severe** **94.0** %
7.4 Comments:
**Reach is a drainage ditch.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **35.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **57.0** %
Current Sub-Dominant Land Cover: **Field**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **0-25** |
| Sub-dominant: | **51-100** | **51-100** |
| Length w / less than 25 ft.: | **1,883.0** ft. | **1,857.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.3** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **2,521.7** **98.2** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **459.2** ft. **0.0** ft.
6.3 Channel Bars: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M17**
SGAT Version: **4.56**
Date Last Edited: **February, 21 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From confluence with T6 up to slope change at Forest Road crossing.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6316485464**

1.3 Downstream Longitude: **-73.1029290737**

Step 2. Stream Type

| | | | |
|---|---|---|---|
| 2.1 Elevation Upstream: | **530** | | |
| 2.1 Elevation Downstream: | **333** | | |
| 2.1 Is Gradient Gentle?: | **No** | | |
| 2.2 Valley Length: | **4,412.0** ft. | **0.84** | Miles |
| 2.3 Valley Slope: | **4.5** | | |
| 2.4 Channel Length: | **5,114.3** ft. | **0.97** | Miles |
| 2.5 Channel Slope: | **3.86 %** | | |
| 2.6 Sinuosity: | **1.16** | | |
| 2.7 Watershed Area: | **2.6** Square Miles | | |
| 2.8 Channel Width: | **20.3** feet | | |
| 2.9 Valley Width: | **75.0** feet | | |
| 2.10 Confinement Ratio: | **3.7** | | |
| 2.10 Confinement Type: | **Semi-confined** | | |
| 2.11 Reference Stream Type: | **B** | | |
| Bedform: | **Step-Pool** | | |
| Sub-Class Slope: | **None** | | |
| Bed Material: | **Cobble** | | |

Step 3. Basin Charateristicts

| | | |
|---|---|---|
| 3.1 Alluvial Fan: | **None** | |
| 3.2 Grade Control: | **Multiple** | |
| 3.3 Dominant Geological Mat.: | **Till** | **64.0** % |
| 3.3 Sub-dom. Geological Mat.: | **Ice-Contact** | |
| 3.4 Valley Slope Left: | **Ext. Steep** | |
| 3.4 Valley Slope Right: | **Ext. Steep** | |
| 3.5 Soils | | |
| Hydrologic Group: | **C** | **73.0** % |
| Flooding: | **None/Rare** | **91.0** % |
| Water Table Deep: | **2.5** | **64.0** % |
| Water Table Shallow: | **1.5** | **76.0** % |
| Erodibility: | **Very Severe** | **79.0** % |

7.4 Comments:

**Ice/debris jam impacts to infrastructure are low given the straightening observed; debris jams in upper reach less likely to cause impact to this culvert.**

**Reach M17 was segmented into 2 segments M17-A (916ft) and M17-B (4,197ft). Segmentation was done to highlight differences in reference stream type and impacts from straightening in segment M17-A. Segment**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

| | | |
|---|---|---|
| Historic Land Cover: | **Field** | |
| Current Dominant Land Cover: | **Forest** | **70.0** % |
| Current Sub-Dominant Land Cover: | **Crop** | |

4.2 Corridor

| | | |
|---|---|---|
| Historic Land Cover:: | **Forest** | |
| 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: | **51-100** | **51-100** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

| | | | |
|---|---|---|---|
| 5.1 Flow Regulation - (old): | **None** | | |
| Type: | **None** | | |
| Use: | | | |
| 5.2 Bridges and Culverts: | **2** | **1.5** % | |
| 5.3 Bank Armoring: | **0.0** | **0.0** % | |
| Left: | **0.0** ft. | Right: | **0.0** ft. |
| 5.4 Channel Straightening: | **732.9** | **14.3** % | |
| 5.5 Dredging History: | **None** | | |

Step 6. Floodplain Modifications

| | | |
|---|---|---|
| 6.1 Berms & Roads - old: | **109.8** ft. | **2.1** |
| | One Side | Both Sides |
| Road: | **109.8** 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: | **214.6** ft. | **0.0** ft. |
| 6.3 Channel Bars: | **Point** | |
| 6.4 Meander Migration: | **Multiple** | |
| 6.5 Meander Width: | **N/A** Rato: | **0.0** |
| 6.6 Wavelength: | **N/A** Ratio: | **0.0** |

Step 7. Windshield Survey

| | | |
|---|---|---|
| 7.1 Bank Erosion: | **341.03** | ft |
| 7.2 Bank Height: | **3** | 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 1 Low | 0 N.S. | 0 N.S. | 0 N.S. | 1 Low | 2 High | 0 N/A | 0 N/A | 1 Low | 1 Low | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M18**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Begins at e Forest Rd Crossing and ends at the change in confinement and slope approximately 1,000 feet upstream.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6343247822**

1.3 Downstream Longitude: **-73.0885035725**

Step 2. Stream Type

2.1 Elevation Upstream: **542**
2.1 Elevation Downstream: **530**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **952.0** ft. **0.18** Miles
2.3 Valley Slope: **1.3**
2.4 Channel Length: **1,052.2** ft. **0.20** Miles
2.5 Channel Slope: **1.14 %**
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **2.3** Square Miles
2.8 Channel Width: **18.9** feet
2.9 Valley Width: **190.0** feet
2.10 Confinement Ratio: **10.1**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **65.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **A** **65.0** %
Flooding: **None/Rare** **71.0** %
Water Table Deep: **6.0** **71.0** %
Water Table Shallow: **6.0** **65.0** %
Erodibility: **Severe** **71.0** %
7.4 Comments:

**Short unconfined reach downstream of a large bedrock cascade area (M19).**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **73.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Crop** **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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **41 ft.** Ratio: **2.2**
6.6 Wavelength: **105 ft.** Ratio: **5.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 2 High | 2 High | 0 N.S. | 0 N.S. | 9 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M19**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Short reach with bedrock cascade and steep vertical profile; reach ends where valley broadens extensively.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6357749631**

1.3 Downstream Longitude: **-73.0856153071**

Step 2. Stream Type

2.1 Elevation Upstream: **585**
2.1 Elevation Downstream: **542**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **651.0** ft. **0.12** Miles
2.3 Valley Slope: **6.6**
2.4 Channel Length: **688.7** ft. **0.13** Miles
2.5 Channel Slope: **6.24 %**
2.6 Sinuosity: **1.06**
2.7 Watershed Area: **2.1** Square Miles
2.8 Channel Width: **18.1** feet
2.9 Valley Width: **52.0** feet
2.10 Confinement Ratio: **2.9**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-Class Slope: **None**
Bed Material: **Bedrock**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Waterfall**
3.3 Dominant Geological Mat.: **Till** **54.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Ext. Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **D** **81.0** %
Flooding: **None/Rare** **93.0** %
Water Table Deep: **6.0** **42.0** %
Water Table Shallow: **2.0** **42.0** %
Erodibility: **Severe** **55.0** %
7.4 Comments:

**Reach is primarily a large bedrock cascade with a straightened channel upstream.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **72.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Crop** **20.0** %
Current Sub-Dominant Land Cover: **Urban**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **0-25** |
| Length w / less than 25 ft.: | **123.0** ft. | **163.0** ft. |

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.9** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 0 N.S. | 0 N/A | 0 N/A | 0 N.S. | 0 N.S. | 6 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M20**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Long reach in very broad valley along Westford Road ends at change in confinement and slope.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6367211005**

1.3 Downstream Longitude: **-73.0834856**

Step 2. Stream Type

2.1 Elevation Upstream: **608**
2.1 Elevation Downstream: **585**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **3,601.0** ft. **0.68** Miles
2.3 Valley Slope: **0.6**
2.4 Channel Length: **3,711.0** ft. **0.70** Miles
2.5 Channel Slope: **0.62 %**
2.6 Sinuosity: **1.03**
2.7 Watershed Area: **2.1** Square Miles
2.8 Channel Width: **18.0** feet
2.9 Valley Width: **363.0** feet
2.10 Confinement Ratio: **20.1**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **49.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **C** **45.0** %
Flooding: **None/Rare** **84.0** %
Water Table Deep: **2.5** **39.0** %
Water Table Shallow: **0.0** **46.0** %
Erodibility: **Moderate** **45.0** %
7.4 Comments:

**Culverts might pose as potential impacts for ice jams. The channel is entirely straightened and would likely look like reaches M13 and M14 if it wasn""t so heavily impacted by early agriculture. Extensive straightening and no buffer; lots of opportunities for restoration.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **73.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **24.0** %
Current Sub-Dominant Land Cover: **Field**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **0-25** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **3,701.0** ft. | **3,682.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **4** **2.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **3,653.9** **98.5** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **101.4** ft. **0.0** ft.
6.3 Channel Bars: **None**
6.4 Meander Migration: **Neck Cutoff**
6.5 Meander Width: **18 ft.** Rato: **1.0**
6.6 Wavelength: **18 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 2 High | 2 High | 2 High | 0 N.S. | 1 Low | 15 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M21**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Short reach that begins at the change in confinement and ends at the confluence with T7 near Ted Rd and Westford Rd intersection.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6431066005**

1.3 Downstream Longitude: **-73.0732848**

Step 2. Stream Type

2.1 Elevation Upstream: **624**
2.1 Elevation Downstream: **608**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **894.0** ft. **0.17** Miles
2.3 Valley Slope: **1.7**
2.4 Channel Length: **1,050.6** ft. **0.20** Miles
2.5 Channel Slope: **1.48 %**
2.6 Sinuosity: **1.18**
2.7 Watershed Area: **1.6** Square Miles
2.8 Channel Width: **16.0** feet
2.9 Valley Width: **119.0** feet
2.10 Confinement Ratio: **7.4**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **99.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **D** **69.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **2.0** **63.0** %
Water Table Shallow: **0.0** **63.0** %
Erodibility: **Very Severe** **99.0** %
7.4 Comments:
**NULL**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **78.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Forest** **19.0** %
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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **164.9** ft. **0.0** ft.
6.3 Channel Bars: **No Data**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **36 ft.** Ratio: **2.3**
6.6 Wavelength: **91 ft.** Ratio: **5.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 0 N.S. | 1 Low | 2 High | 2 High | 0 N.S. | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M22**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Reach begins at the confluence with T7 and extends upstream ending about 660 feet downstream of the Brookside Drive crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6440364917**

1.3 Downstream Longitude: **-73.0701664103**

Step 2. Stream Type

2.1 Elevation Upstream: **700**
2.1 Elevation Downstream: **624**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,190.0** ft. **0.23** Miles
2.3 Valley Slope: **6.4**
2.4 Channel Length: **1,297.9** ft. **0.25** Miles
2.5 Channel Slope: **5.89 %**
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **1.0** Square Miles
2.8 Channel Width: **12.9** feet
2.9 Valley Width: **50.0** feet
2.10 Confinement Ratio: **3.9**
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 Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Waterfall**
3.3 Dominant Geological Mat.: **Till** **40.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **D** **67.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **2.0** **40.0** %
Water Table Shallow: **0.0** **67.0** %
Erodibility: **Severe** **72.0** %

7.4 Comments:
**Grade control located in lower reach discerned using LiDAR data and confirmed during windshield surveys.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Crop** **37.0** %
Current Sub-Dominant Land Cover: **Urban**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **0-25** |
| Length w / less than 25 ft.: | **53.0** ft. | **256.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.1** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **152.2** ft. **11.7**

| | One Side | Both Sides |
|---|---|---|
| Road: | **152.2** 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: **290.6** ft. **0.0** ft.
6.3 Channel Bars: **Mid-channel**
6.4 Meander Migration: **Flood Chute**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Low | 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. | 1 Low | 0 N/A | 0 N/A | 0 N.S. | 0 N.S. | 9 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M23**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Short, straightened reach that ends at the man-made pond approximately 340 feet upstream of the Brookside Drive crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6437607816**

1.3 Downstream Longitude: **-73.0657724044**

Step 2. Stream Type

2.1 Elevation Upstream: **717**
2.1 Elevation Downstream: **700**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **990.0** ft. **0.19** Miles
2.3 Valley Slope: **1.7**
2.4 Channel Length: **1,011.9** ft. **0.19** Miles
2.5 Channel Slope: **1.68 %**
2.6 Sinuosity: **1.02**
2.7 Watershed Area: **0.9** Square Miles
2.8 Channel Width: **12.6** feet
2.9 Valley Width: **202.0** feet
2.10 Confinement Ratio: **16.0**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **87.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **D** **87.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **0.5** **87.0** %
Water Table Shallow: **0.0** **87.0** %
Erodibility: **slight** **12.0** %
7.4 Comments:

**Small culverts, extensive straightening, and no buffer. Lots of opportunities for restoration.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **79.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Urban** **46.0** %
Current Sub-Dominant Land Cover: **Wetland**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **0-25** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **1,011.0** ft. | **1,011.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **3** **6.1** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **1,005.1** **99.3** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **23.9** ft. **2.4**

| | One Side | Both Sides |
|---|---|---|
| Road: | **23.9** 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: **12 ft.** Rato: **1.0**
6.6 Wavelength: **12 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Low | 2 High | 2 High | 0 N.S. | 1 Low | 0 N.S. | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 2 High | 0 N.S. | 1 Low | 13 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M24**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break up to the Westford Road crossing.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6428259005**

1.3 Downstream Longitude: **-73.0622836**

Step 2. Stream Type

2.1 Elevation Upstream: **766**
2.1 Elevation Downstream: **717**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **892.0** ft. **0.17** Miles
2.3 Valley Slope: **5.5**
2.4 Channel Length: **940.3** ft. **0.18** Miles
2.5 Channel Slope: **5.21 %**
2.6 Sinuosity: **1.05**
2.7 Watershed Area: **0.3** Square Miles
2.8 Channel Width: **7.9** feet
2.9 Valley Width: **30.0** feet
2.10 Confinement Ratio: **3.8**
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 Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **95.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **D** **87.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **2.0** **34.0** %
Water Table Shallow: **0.0** **34.0** %
Erodibility: **Severe** **66.0** %
7.4 Comments:
**Farm path stream ford crossing mid-reach.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **75.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Shrub**
Current Dominant Land Cover: **Crop** **35.0** %
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.: | **221.0** ft. | **477.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications
5.1 Flow Regulation - (old): **None**
Type: **Large Run of River**
Use: **Other**
5.2 Bridges and Culverts: **1** **2.1** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **116.0** **12.3** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications
6.1 Berms & 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: **77.0** ft. **0.0** ft.
6.3 Channel Bars: **None**
6.4 Meander Migration: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Low | 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 1 Low | 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 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Malletts Creek Main Stem**
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **M25**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the Westford Road crossing the reach extends north up the mountain.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6427664882**

1.3 Downstream Longitude: **-73.0595335878**

Step 2. Stream Type

2.1 Elevation Upstream: **912**
2.1 Elevation Downstream: **766**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,525.0** ft. **0.29** Miles
2.3 Valley Slope: **9.6**
2.4 Channel Length: **1,578.0** ft. **0.30** Miles
2.5 Channel Slope: **9.25 %**
2.6 Sinuosity: **1.03**
2.7 Watershed Area: **0.2** Square Miles
2.8 Channel Width: **6.8** feet
2.9 Valley Width: **24.0** feet
2.10 Confinement Ratio: **3.5**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-Class Slope: **None**
Bed Material: **Cobble**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **50.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **A** **49.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **93.0** %
Water Table Shallow: **6.0** **49.0** %
Erodibility: **Very Severe** **99.0** %
7.4 Comments:

**High energy reach with steep slope off of the mountainside the old stone culvert might be inadequately sized.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **81.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **50.0** %
Current Sub-Dominant Land Cover: **Field**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **51-100** |
| Length w / less than 25 ft.: | **0.0** ft. | **195.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications
5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **2.5** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications
6.1 Berms & Roads - old: **137.8** ft. **8.7**

| | 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: | **137.8** ft. | **0.0** ft. |

6.2 Development: **213.8** ft. **0.0** ft.
6.3 Channel Bars: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey
7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Low | 2 High | 1 Low | 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. | 0 N/A | 0 N/A | 0 N.S. | 1 Low | 7 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the confluence with M01 (Lake Champlain) to just upstream of the Route 7 crossing.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5742412712**

1.3 Downstream Longitude: **-73.172950892**

Step 2. Stream Type

2.1 Elevation Upstream: **106**
2.1 Elevation Downstream: **98**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **4,179.0** ft. **0.79** Miles
2.3 Valley Slope: **0.2**
2.4 Channel Length: **5,023.6** ft. **0.95** Miles
2.5 Channel Slope: **0.16 %**
2.6 Sinuosity: **1.20**
2.7 Watershed Area: **5.4** Square Miles
2.8 Channel Width: **27.4** feet
2.9 Valley Width: **748.0** feet
2.10 Confinement Ratio: **27.3**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **98.0** %
3.3 Sub-dom. Geological Mat.: **Ice-Contact**
3.4 Valley Slope Left: **Flat**
3.4 Valley Slope Right: **Flat**
3.5 Soils
Hydrologic Group: **C** **98.0** %
Flooding: **Frequent** **98.0** %
Water Table Deep: **1.5** **98.0** %
Water Table Shallow: **0.0** **98.0** %
Erodibility: **slight** **1.0** %
7.4 Comments:

**Water elevation in the lower portion of the reach is controlled by the lake level and a wetland complex. Area likely to be segmented out if Phase 2 assessments considered. Also, flow becomes very diffuse downstream of Route 7 likely a segment.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **40.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Wetland** **59.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **51-100** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.7** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **250.1** **5.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Avulsion**
6.5 Meander Width: **107 ft.** Ratio: **3.9**
6.6 Wavelength: **347 ft.** Ratio: **12.7**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 1 Low | 0 N.S. | 0 N.S. | 1 Low | 7 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break upstream of the Route 7 Crossing up to the confluence with T1.S1.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5750778524**

1.3 Downstream Longitude: **-73.1580100315**

Step 2. Stream Type

2.1 Elevation Upstream: **108**
2.1 Elevation Downstream: **106**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,032.0** ft. **0.20** Miles
2.3 Valley Slope: **0.2**
2.4 Channel Length: **1,602.6** ft. **0.30** Miles
2.5 Channel Slope: **0.12 %**
2.6 Sinuosity: **1.55**
2.7 Watershed Area: **4.4** Square Miles
2.8 Channel Width: **16.4** feet
2.9 Valley Width: **305.0** feet
2.10 Confinement Ratio: **18.6**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **66.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **C** **66.0** %
Flooding: **Frequent** **66.0** %
Water Table Deep: **1.5** **66.0** %
Water Table Shallow: **0.0** **66.0** %
Erodibility: **slight** **10.0** %
7.4 Comments:
**Reach has had some straightening near the road.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **41.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **49.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **51-100** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **945.3** **59.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Neck Cutoff**
6.5 Meander Width: **75 ft.** Ratio: **4.6**
6.6 Wavelength: **130 ft.** Ratio: **7.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **182.08** ft
7.2 Bank Height: **2** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 0 N.S. | 0 Unk. | 0 N.S. | 0 N.S. | 1 Low | 1 Low | 1 Low | 1 Low | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.03**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break approximately 800 feet downstream of Coon Hill Rd up to the confluence with T1.S2.01.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5769886829**

1.3 Downstream Longitude: **-73.1552913695**

Step 2. Stream Type

2.1 Elevation Upstream: **116**
2.1 Elevation Downstream: **108**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,906.0** ft. **0.36** Miles
2.3 Valley Slope: **0.4**
2.4 Channel Length: **2,706.3** ft. **0.51** Miles
2.5 Channel Slope: **0.30 %**
2.6 Sinuosity: **1.42**
2.7 Watershed Area: **3.8** Square Miles
2.8 Channel Width: **17.0** feet
2.9 Valley Width: **191.0** feet
2.10 Confinement Ratio: **11.2**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **100.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Ext. Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **Not Rated** **58.0** %
Flooding: **Frequent** **100.0** %
Water Table Deep: **1.5** **41.0** %
Water Table Shallow: **0.0** **41.0** %
Erodibility: **0.0** %

7.4 Comments:

**The lower portion of the reach has some buffer impacts on the left side, but otherwise the reach is well buffered. The crossing at Coon Hill Road has several problems. The culvert is undersized which is causing erosion and scour downstream. Also, the water backs up upstream causing aggradation and bank scour. This culvert is a high-priority for replacement.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **39.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **42.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **51-100** |
| Length w / less than 25 ft.: | **983.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.9** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **606.7** **22.4** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Neck Cutoff**
6.5 Meander Width: **51 ft.** Ratio: **3.0**
6.6 Wavelength: **96 ft.** Ratio: **5.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **741.47** ft
7.2 Bank Height: **3** 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 | 7.3 | 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. | 2 High | 1 Low | 1 Low | 2 High | 2 High | 2 High | 18 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.04**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break to the VAST trail crossing in the woods east of Wiley Rd.**

1.1 Reach Description:

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5813842404**

1.3 Downstream Longitude: **-73.1593557555**

Step 2. Stream Type

2.1 Elevation Upstream: **143**
2.1 Elevation Downstream: **116**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **4,019.0** ft. **0.76** Miles
2.3 Valley Slope: **0.7**
2.4 Channel Length: **5,392.1** ft. **1.02** Miles
2.5 Channel Slope: **0.50 %**
2.6 Sinuosity: **1.34**
2.7 Watershed Area: **2.9** Square Miles
2.8 Channel Width: **15.2** feet
2.9 Valley Width: **146.0** feet
2.10 Confinement Ratio: **9.6**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **65.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **Not Rated** **58.0** %
Flooding: **None/Rare** **79.0** %
Water Table Deep: **2.0** **27.0** %
Water Table Shallow: **0.5** **25.0** %
Erodibility: **Moderate** **40.0** %
7.4 Comments:

**Reach has minor buffer impacts at upstream break where the VAST trail parallels the channel for only 45 ft.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **37.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
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: | **None** | **0-25** |
| Length w / less than 25 ft.: | **0.0** ft. | **45.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **1,153.8** **21.4** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **60 ft.** Ratio: **3.9**
6.6 Wavelength: **107 ft.** Ratio: **7.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **624.18** ft
7.2 Bank Height: **2** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 0 N.S. | 0 Unk. | 0 N.S. | 0 N.S. | 1 Low | 1 Low | 1 Low | 1 Low | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.05**
SGAT Version: **4.56**
Date Last Edited: **February, 21 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the reach break with T1.04 up to the slight change in confinement 1,610 feet due east of the Brentwood Drive and Route 7 intersection.**

1.2 Towns: **Colchester, Milton**

1.3 Downstream Latitude: **44.5912726877**
1.3 Downstream Longitude: **-73.1635564328**

Step 2. Stream Type

2.1 Elevation Upstream: **150**
2.1 Elevation Downstream: **143**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,630.0** ft. **0.31** Miles
2.3 Valley Slope: **0.4**
2.4 Channel Length: **1,860.2** ft. **0.35** Miles
2.5 Channel Slope: **0.38 %**
2.6 Sinuosity: **1.14**
2.7 Watershed Area: **2.7** Square Miles
2.8 Channel Width: **14.0** feet
2.9 Valley Width: **86.0** feet
2.10 Confinement Ratio: **6.1**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **61.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **A** **61.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **63.0** %
Water Table Shallow: **6.0** **63.0** %
Erodibility: **Very Severe** **76.0** %

7.4 Comments:

**VAST trail bridge looks problematic and large debris pile located at stream bend downstream of structure. This pile is outside of the channel (in floodplain) and is not currently influencing the channel stability and is not expected to do so in the near future. Otherwise the reach isolated with little problems.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **37.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
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: | **None** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.8** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **48 ft.** Ratio: **3.4**
6.6 Wavelength: **101 ft.** Ratio: **7.2**

Step 7. Windshield Survey

7.1 Bank Erosion: **149.32** ft
7.2 Bank Height: **3** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 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. | 1 Low | 1 Low | 1 Low | 1 Low | 6 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.06**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Reach extends up broad valley ending approximately 320 feet upstream of teh Allen Brook Drive crossing.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.5948898193**

1.3 Downstream Longitude: **-73.1600577237**

Step 2. Stream Type

2.1 Elevation Upstream: **171**
2.1 Elevation Downstream: **150**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,630.0** ft. **0.31** Miles
2.3 Valley Slope: **1.3**
2.4 Channel Length: **4,572.9** ft. **0.87** Miles
2.5 Channel Slope: **0.46 %**
2.6 Sinuosity: **2.81**
2.7 Watershed Area: **2.6** Square Miles
2.8 Channel Width: **12.8** feet
2.9 Valley Width: **153.0** feet
2.10 Confinement Ratio: **12.0**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **74.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **A** **57.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **57.0** %
Water Table Shallow: **6.0** **57.0** %
Erodibility: **Very Severe** **78.0** %
7.4 Comments:

**Lower portion of the reach is isolated with few impacts however upper portion has straightening and buffer impacts.**

**Reach T1.06 was segmented into 3 segments T1.06-A (2,816ft), T1.06-B (1,009ft), and T1.06-C (747ft). Segmentation was done to highlight reference habitat conditions in segment T1.06-A. Segment T1.06-B was not assessed fully because of property access issues and T1.06-C had**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **38.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Crop** **26.0** %
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.: | **1,327.0** ft. | **1,507.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **4.4** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **594.0** **13.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **1,041.6** ft. **22.8**

| | One Side | Both Sides |
|---|---|---|
| Road: | **1,041.6** 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: **350.5** ft. **0.0** ft.
6.3 Channel Bars: **Point**
6.4 Meander Migration: **Multiple**
6.5 Meander Width: **42 ft.** Rato: **3.3**
6.6 Wavelength: **75 ft.** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **421.39** ft
7.2 Bank Height: **3** 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 | 7.3 | 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 | 1 Low | 2 High | 1 Low | 1 Low | 16 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.06.t1.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with Allen Brook reach T1.06 730 feet due south of teh Route 7 and Sweeny Farm Rd intersection up to the reach break 200 feet upstream of the detention pond.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6003660861**
1.3 Downstream Longitude: **-73.1613788815**

Step 2. Stream Type

2.1 Elevation Upstream: **170**
2.1 Elevation Downstream: **163**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **950.0** ft. **0.18** Miles
2.3 Valley Slope: **0.7**
2.4 Channel Length: **991.5** ft. **0.19** Miles
2.5 Channel Slope: **0.71 %**
2.6 Sinuosity: **1.04**
2.7 Watershed Area: **0.7** Square Miles
2.8 Channel Width: **11.1** feet
2.9 Valley Width: **134.0** feet
2.10 Confinement Ratio: **12.1**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **59.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **A** **48.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **48.0** %
Water Table Shallow: **6.0** **48.0** %
Erodibility: **Very Severe** **91.0** %
7.4 Comments:

**Instream detention basin occupies most of the reach length. Not worth further assessment.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Urban** **43.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Urban** **34.0** %
Current Sub-Dominant Land Cover: **Crop**

| 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.: | **657.0** ft. | **536.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **Impoundment**
Type: **Large Run of River**
Use: **Other**
5.2 Bridges and Culverts: **1** **21.7** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **727.0** **73.3** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **11 ft.** Rato: **1.0**
6.6 Wavelength: **11 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 2 High | 2 High | 2 High | 0 N.S. | 2 High | 0 N.S. | 0 Unk. | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 2 High | 0 N.S. | 1 Low | 17 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.07**
SGAT Version: **4.56**
Date Last Edited: **November, 10 2010**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Reach extends from upstream of Allen Brook Rd and ends at the confluence of T1.S3.**

1.1 Reach Description:

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6031518631**

1.3 Downstream Longitude: **-73.1583108942**

Step 2. Stream Type

2.1 Elevation Upstream: **186**
2.1 Elevation Downstream: **171**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,119.0** ft. **0.21** Miles
2.3 Valley Slope: **1.3**
2.4 Channel Length: **1,344.5** ft. **0.25** Miles
2.5 Channel Slope: **1.12 %**
2.6 Sinuosity: **1.20**
2.7 Watershed Area: **1.5** Square Miles
2.8 Channel Width: **15.6** feet
2.9 Valley Width: **119.0** feet
2.10 Confinement Ratio: **7.6**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **67.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **B** **67.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **3.0** **67.0** %
Water Table Shallow: **1.5** **67.0** %
Erodibility: **0.0** %
7.4 Comments:

**Isolated reach with minor impacts.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **53.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Forest** **36.0** %
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.: | ft. | ft. |

4.4 Ground Water Inputs: **Minimal**

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

Step 6. Floodplain Modifications
6.1 Berms & 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: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **42 ft.** Ratio: **2.7**
6.6 Wavelength: **75 ft.** Ratio: **4.8**

Step 7. Windshield Survey
7.1 Bank Erosion: **0** ft
7.2 Bank Height: **0** ft
7.3 Ice/Debris Jam Potential: **No Data**

| 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 1 Low | 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. | 2 High | 2 High | 0 N.S. | 0 N.S. | 7 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.08**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **Reach begins at the confluence with T1.S3 and ends at the confluence with T1.S4 approximately 240 feet upstream of the Petty Brook Road crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6048590644**
1.3 Downstream Longitude: **-73.1548216329**

Step 2. Stream Type

2.1 Elevation Upstream: **192**
2.1 Elevation Downstream: **186**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,142.0** ft. **0.22** Miles
2.3 Valley Slope: **0.5**
2.4 Channel Length: **1,295.0** ft. **0.25** Miles
2.5 Channel Slope: **0.46 %**
2.6 Sinuosity: **1.13**
2.7 Watershed Area: **1.0** Square Miles
2.8 Channel Width: **13.0** feet
2.9 Valley Width: **141.0** feet
2.10 Confinement Ratio: **10.9**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **77.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **A** **75.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **88.0** %
Water Table Shallow: **6.0** **88.0** %
Erodibility: **slight** **22.0** %
7.4 Comments:

**Culvert crossing small and could cause impounding if blocked by debris/ice.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **44.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Forest** **42.0** %
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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **4.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **32 ft.** Ratio: **2.5**
6.6 Wavelength: **62 ft.** Ratio: **4.8**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 2 High | 2 High | 0 N.S. | 1 Low | 9 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.09**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with T1.S4 the reach extends up the valley to the east of Andrea Lane, ending 790 feet to the east of the nothern most intersection with Route 7.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6076351677**

1.3 Downstream Longitude: **-73.1540957196**

Step 2. Stream Type

2.1 Elevation Upstream: **230**
2.1 Elevation Downstream: **192**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **3,154.0** ft. **0.60** Miles
2.3 Valley Slope: **1.2**
2.4 Channel Length: **4,009.9** ft. **0.76** Miles
2.5 Channel Slope: **0.95 %**
2.6 Sinuosity: **1.27**
2.7 Watershed Area: **0.7** Square Miles
2.8 Channel Width: **11.3** feet
2.9 Valley Width: **151.0** feet
2.10 Confinement Ratio: **13.3**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **74.0** %
3.3 Sub-dom. Geological Mat.: **Other**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **Not Rated** **74.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **0.0** **13.0** %
Water Table Shallow: **-1.0** **13.0** %
Erodibility: **slight** **2.0** %
7.4 Comments:

**Lower reach has one crossing and some straightening, but upstream very little in the corridor.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **52.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Urban** **26.0** %
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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.5** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **148.5** **3.7** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Braiding**
6.5 Meander Width: **32 ft.** Ratio: **2.8**
6.6 Wavelength: **67 ft.** Ratio: **5.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 2 High | 2 High | 0 N.S. | 0 N.S. | 9 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name: **Allen (Petty) Brook**
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.10**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **The reach extends to the east crossing over Forbes Rd and Racine Rd, ending approximately 350 feet to the east of the Racine Rd crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6147183507**

1.3 Downstream Longitude: **-73.1488038091**

Step 2. Stream Type

2.1 Elevation Upstream: **318**
2.1 Elevation Downstream: **230**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,297.0** ft. **0.44** Miles
2.3 Valley Slope: **3.8**
2.4 Channel Length: **2,471.8** ft. **0.47** Miles
2.5 Channel Slope: **3.56 %**
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **0.5** Square Miles
2.8 Channel Width: **9.3** feet
2.9 Valley Width: **45.0** feet
2.10 Confinement Ratio: **4.8**
2.10 Confinement Type: **Narrow**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **b**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **38.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **D** **39.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **66.0** %
Water Table Shallow: **6.0** **66.0** %
Erodibility: **Severe** **66.0** %

7.4 Comments:
**Lower reach well buffered, but upper reach extensively straightened with two culverts.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **53.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Forest**
Current Dominant Land Cover: **Forest** **26.0** %
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.: | **620.0** ft. | **347.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **3.7** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **684.5** **27.7** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **148.8** ft. **0.0** ft.
6.3 Channel Bars: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S1.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with the main stem of Allen (Petty) Brook the reach extends to the northeast ending where the channel hits the forest.**

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5768528249**

1.3 Downstream Longitude: **-73.155159538**

Step 2. Stream Type

2.1 Elevation Upstream: **116**
2.1 Elevation Downstream: **108**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **574.0** ft. **0.11** Miles
2.3 Valley Slope: **1.4**
2.4 Channel Length: **656.4** ft. **0.12** Miles
2.5 Channel Slope: **1.22 %**
2.6 Sinuosity: **1.14**
2.7 Watershed Area: **0.6** Square Miles
2.8 Channel Width: **10.3** feet
2.9 Valley Width: **186.0** feet
2.10 Confinement Ratio: **18.0**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **100.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **C** **100.0** %
Flooding: **Frequent** **100.0** %
Water Table Deep: **1.5** **100.0** %
Water Table Shallow: **0.0** **100.0** %
Erodibility: **0.0** %
7.4 Comments:

**Some buffer issues that could addressed.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **23.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **0-25** |
| Sub-dominant: | **26-50** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **614.0** ft. |

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **Flood Chute**
6.5 Meander Width: **30 ft.** Ratio: **2.9**
6.6 Wavelength: **78 ft.** Ratio: **7.6**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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 | 1 Low | 0 N.S. | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S1.02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the reach break the channel extends to the northwest in the forest. The reach ends at the change in slope approximately 400 feet to the southwest of a pond.**

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5778502005**

1.3 Downstream Longitude: **-73.1535472**

Step 2. Stream Type

2.1 Elevation Upstream: **200**
2.1 Elevation Downstream: **116**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,465.0** ft. **0.47** Miles
2.3 Valley Slope: **3.4**
2.4 Channel Length: **2,675.5** ft. **0.51** Miles
2.5 Channel Slope: **3.14 %**
2.6 Sinuosity: **1.09**
2.7 Watershed Area: **0.6** Square Miles
2.8 Channel Width: **10.1** feet
2.9 Valley Width: **88.0** feet
2.10 Confinement Ratio: **8.7**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **b**
Bed Material: **Cobble**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **81.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **D** **45.0** %
Flooding: **None/Rare** **81.0** %
Water Table Deep: **2.0** **45.0** %
Water Table Shallow: **0.0** **63.0** %
Erodibility: **Moderate** **45.0** %
7.4 Comments:
**Reach well buffered and isolated with little impacts.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **56.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Shrub**
Current Dominant Land Cover: **Forest** **31.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **0.6** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **34 ft.** Ratio: **3.4**
6.6 Wavelength: **103 ft.** Ratio: **10.2**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 1 Low | 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. | 1 Low | 0 N.S. | 0 N.S. | 0 N.S. | 4 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S1.03**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **T1.S1.03 extends to the east ending at the Middle Road crossing.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5814976934**
1.3 Downstream Longitude: **-73.1461425917**

Step 2. Stream Type

2.1 Elevation Upstream: **250**
2.1 Elevation Downstream: **200**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,941.0** ft. **0.37** Miles
2.3 Valley Slope: **2.6**
2.4 Channel Length: **2,158.8** ft. **0.41** Miles
2.5 Channel Slope: **2.32 %**
2.6 Sinuosity: **1.11**
2.7 Watershed Area: **0.4** Square Miles
2.8 Channel Width: **8.5** feet
2.9 Valley Width: **134.0** feet
2.10 Confinement Ratio: **15.8**
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 Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **95.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **D** **83.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **2.0** **79.0** %
Water Table Shallow: **0.0** **41.0** %
Erodibility: **Very Severe** **82.0** %
7.4 Comments:
**Some straightening in the upper reach.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **48.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **10.0** %
Current Sub-Dominant Land Cover: **Field**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **51-100** |
| Length w / less than 25 ft.: | **778.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.2** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **499.1** **23.1** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **42 ft.** Ratio: **5.0**
6.6 Wavelength: **106 ft.** Ratio: **12.5**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 0 N.S. | 0 N.S. | 1 Low | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Short reach in the confined area begining at the confluence with Allen Brook extending 600 feet to the northeast.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5813672763**
1.3 Downstream Longitude: **-73.1592118625**

Step 2. Stream Type

2.1 Elevation Upstream: **172**
2.1 Elevation Downstream: **116**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **573.0** ft. **0.11** Miles
2.3 Valley Slope: **9.8**
2.4 Channel Length: **678.6** ft. **0.13** Miles
2.5 Channel Slope: **8.25 %**
2.6 Sinuosity: **1.18**
2.7 Watershed Area: **0.8** Square Miles
2.8 Channel Width: **11.6** feet
2.9 Valley Width: **27.0** feet
2.10 Confinement Ratio: **2.3**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Cascade**
Sub-Class Slope: **None**
Bed Material: **Boulder**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **Ledge**
3.3 Dominant Geological Mat.: **Ice-Contact** **78.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Ext. Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **A** **78.0** %
Flooding: **None/Rare** **78.0** %
Water Table Deep: **6.0** **78.0** %
Water Table Shallow: **6.0** **78.0** %
Erodibility: **Very Severe** **78.0** %
7.4 Comments:
**Isolated reach with large grade control discerned from LiDAR data.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Forest**
Current Dominant Land Cover: **Forest** **45.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Forest**
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.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **None**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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 |

# Malletts Creek

# Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From reach break at change in confinement T1.S2.02 extends to northwest ending at beaver dam area and change in slope.**

1.2 Towns: **Colchester**

1.3 Downstream Latitude: **44.5829808016**

1.3 Downstream Longitude: **-73.1587345383**

Step 2. Stream Type

2.1 Elevation Upstream: **178**
2.1 Elevation Downstream: **172**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **767.0** ft. **0.15** Miles
2.3 Valley Slope: **0.8**
2.4 Channel Length: **842.4** ft. **0.16** Miles
2.5 Channel Slope: **0.71 %**
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **0.7** Square Miles
2.8 Channel Width: **11.5** feet
2.9 Valley Width: **90.0** feet
2.10 Confinement Ratio: **7.8**
2.10 Confinement Type: **Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Ice-Contact** **99.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **A** **99.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **6.0** **100.0** %
Water Table Shallow: **6.0** **100.0** %
Erodibility: **Very Severe** **77.0** %
7.4 Comments:
**Some impacts to the buffer with extensive beaver activity upslope.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **45.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Forest** **27.0** %
Current Sub-Dominant Land Cover: **Field**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **0-25** | **None** |
| Length w / less than 25 ft.: | **219.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **Multiple**
6.5 Meander Width: **25 ft.** Ratio: **2.2**
6.6 Wavelength: **73 ft.** Ratio: **6.3**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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 | 1 Low | 0 N.S. | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.03**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Reach is impounded mostly by beaver activity; it ends at the confluence with T1.S2.03.t1.01.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5844721005**
1.3 Downstream Longitude: **-73.1605927**

Step 2. Stream Type

2.1 Elevation Upstream: **190**
2.1 Elevation Downstream: **178**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,603.0** ft. **0.30** Miles
2.3 Valley Slope: **0.7**
2.4 Channel Length: **1,874.2** ft. **0.35** Miles
2.5 Channel Slope: **0.64 %**
2.6 Sinuosity: **1.17**
2.7 Watershed Area: **0.7** Square Miles
2.8 Channel Width: **11.3** feet
2.9 Valley Width: **186.0** feet
2.10 Confinement Ratio: **16.5**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **45.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **C** **45.0** %
Flooding: **None/Rare** **54.0** %
Water Table Deep: **1.5** **45.0** %
Water Table Shallow: **0.0** **72.0** %
Erodibility: **Moderate** **42.0** %
7.4 Comments:
**Extensive beaver activity.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **44.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Wetland**
Current Dominant Land Cover: **Crop** **45.0** %
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.: | **0.0** ft. | **144.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **284.5** **15.2** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **Neck Cutoff**
6.5 Meander Width: **33 ft.** Ratio: **2.9**
6.6 Wavelength: **78 ft.** Ratio: **6.9**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 1 Low | 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 | 1 Low | 0 N.S. | 0 N.S. | 10 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.03.t1.01**
SGAT Version: **4.56**
Date Last Edited: **August, 05 2010**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From confluence with T1.S2.03 reac extends up towards Coon Hill Rd near the intersection with Galvin Hill Rd.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5880235959**
1.3 Downstream Longitude: **-73.1571986623**

Step 2. Stream Type

2.1 Elevation Upstream: **215**
2.1 Elevation Downstream: **190**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **1,482.0** ft. **0.28** Miles
2.3 Valley Slope: **1.7**
2.4 Channel Length: **1,602.9** ft. **0.30** Miles
2.5 Channel Slope: **1.56 %**
2.6 Sinuosity: **1.08**
2.7 Watershed Area: **0.3** Square Miles
2.8 Channel Width: **7.5** feet
2.9 Valley Width: **148.0** feet
2.10 Confinement Ratio: **19.8**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **68.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Very Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **D** **99.0** %
Flooding: **None/Rare** **99.0** %
Water Table Deep: **2.0** **68.0** %
Water Table Shallow: **0.5** **40.0** %
Erodibility: **Very Severe** **80.0** %
7.4 Comments:
**NULL**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **40.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **33.0** %
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.: | ft. | ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

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

Step 6. Floodplain Modifications

6.1 Berms & 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: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **23 ft.** Ratio: **3.1**
6.6 Wavelength: **71 ft.** Ratio: **9.5**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **0** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 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. | 1 Low | 0 N.S. | 0 N.S. | 0 N.S. | 5 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.03.t1.02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the reach break at the slope change up to about 175 feet upstream of the Coon Hill Rd crossing.**

1.1 Reach Description:
1.2 Towns: **Colchester**
1.3 Downstream Latitude: **44.5861869237**
1.3 Downstream Longitude: **-73.154588414**

Step 2. Stream Type

2.1 Elevation Upstream: **240**
2.1 Elevation Downstream: **215**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **450.0** ft. **0.09** Miles
2.3 Valley Slope: **5.6**
2.4 Channel Length: **482.0** ft. **0.09** Miles
2.5 Channel Slope: **5.19 %**
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **0.2** Square Miles
2.8 Channel Width: **6.1** feet
2.9 Valley Width: **23.0** feet
2.10 Confinement Ratio: **3.8**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **A**
Bedform: **Step-Pool**
Sub-Class Slope: **None**
Bed Material: **Cobble**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **72.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Ext. Steep**
3.5 Soils
Hydrologic Group: **D** **100.0** %
Flooding: **None/Rare** **100.0** %
Water Table Deep: **0.5** **72.0** %
Water Table Shallow: **0.0** **72.0** %
Erodibility: **Moderate** **26.0** %
7.4 Comments:
**Reach probably should be segmented because sharp slope change.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **43.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Shrub**
Current Dominant Land Cover: **Urban** **50.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **51-100** | **>100** |
| Sub-dominant: | **26-50** | **51-100** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **8.7** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **0.0** **0.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 0 N.S. | 0 N.S. | 1 Low | 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 | 6 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S2.04**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **Reach extends up to the northeast in the farm field, where it is more of a straightened ditch.**

1.1 Reach Description:

1.2 Towns: **Colchester, Milton**

1.3 Downstream Latitude: **44.5880878477**

1.3 Downstream Longitude: **-73.1572584664**

Step 2. Stream Type

2.1 Elevation Upstream: **217**
2.1 Elevation Downstream: **190**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,524.0** ft. **0.48** Miles
2.3 Valley Slope: **1.1**
2.4 Channel Length: **2,772.3** ft. **0.53** Miles
2.5 Channel Slope: **0.97 %**
2.6 Sinuosity: **1.10**
2.7 Watershed Area: **0.4** Square Miles
2.8 Channel Width: **8.3** feet
2.9 Valley Width: **193.0** feet
2.10 Confinement Ratio: **23.3**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **79.0** %
3.3 Sub-dom. Geological Mat.: **Alluvial**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **D** **72.0** %
Flooding: **None/Rare** **79.0** %
Water Table Deep: **2.0** **56.0** %
Water Table Shallow: **0.0** **90.0** %
Erodibility: **Severe** **55.0** %
7.4 Comments:

**Extensive straightening throughout reach and lots of beaver activity in upper reach.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **49.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **38.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **0-25** |
| Sub-dominant: | **26-50** | **>100** |
| Length w / less than 25 ft.: | **2,203.0** ft. | **1,864.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **2,771.8** **100.0** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **8 ft.** Rato: **1.0**
6.6 Wavelength: **8 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 2 High | 2 High | 0 N.S. | 0 N.S. | 12 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S3.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with Allen Brook the reach extends to the east ending at a beaver dam approximately 1,000 feet upstream of the Petty Brook Rd crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6047389948**

1.3 Downstream Longitude: **-73.15469943**

Step 2. Stream Type

2.1 Elevation Upstream: **224**
2.1 Elevation Downstream: **186**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **2,385.0** ft. **0.45** Miles
2.3 Valley Slope: **1.6**
2.4 Channel Length: **3,032.6** ft. **0.57** Miles
2.5 Channel Slope: **1.25 %**
2.6 Sinuosity: **1.27**
2.7 Watershed Area: **0.5** Square Miles
2.8 Channel Width: **9.3** feet
2.9 Valley Width: **139.0** feet
2.10 Confinement Ratio: **14.9**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **C**
Bedform: **Riffle-Pool**
Sub-Class Slope: **None**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **38.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Very Steep**
3.5 Soils
Hydrologic Group: **C** **46.0** %
Flooding: **None/Rare** **61.0** %
Water Table Deep: **1.5** **38.0** %
Water Table Shallow: **0.0** **50.0** %
Erodibility: **Moderate** **29.0** %
7.4 Comments:

**Isolated reach with few impacts.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Shrub**
Current Dominant Land Cover: **Forest** **76.0** %
Current Sub-Dominant Land Cover: **Crop**

4.2 Corridor
Historic Land Cover:: **Shrub**
Current Dominant Land Cover: **Forest** **37.0** %
Current Sub-Dominant Land Cover: **Crop**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **>100** | **>100** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **0.0** ft. | **0.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **1.2** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **47.9** **1.6** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **None**
6.5 Meander Width: **43 ft.** Ratio: **4.6**
6.6 Wavelength: **98 ft.** Ratio: **10.5**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 1 Low | 0 N.S. | 0 N.S. | 1 Low | 6 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **COLCHESTER**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T1.S4.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with Allen Brook the reach extends to the northwest, crossing over Route 7 and then heads to the north following Route 7.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6075368654**
1.3 Downstream Longitude: **-73.1543370038**

Step 2. Stream Type

2.1 Elevation Upstream: **291**
2.1 Elevation Downstream: **193**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **3,315.0** ft. **0.63** Miles
2.3 Valley Slope: **3.0**
2.4 Channel Length: **3,719.1** ft. **0.70** Miles
2.5 Channel Slope: **2.64 %**
2.6 Sinuosity: **1.12**
2.7 Watershed Area: **0.2** Square Miles
2.8 Channel Width: **6.5** feet
2.9 Valley Width: **131.0** feet
2.10 Confinement Ratio: **20.2**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **b**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Glacial Lake** **53.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Hilly**
3.5 Soils
Hydrologic Group: **B** **41.0** %
Flooding: **None/Rare** **81.0** %
Water Table Deep: **6.0** **35.0** %
Water Table Shallow: **6.0** **35.0** %
Erodibility: **Moderate** **50.0** %
7.4 Comments:
**Extensive straightening in upper reach; mostly a wetland.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Crop** **30.0** %
Current Sub-Dominant Land Cover: **Field**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Field** **26.0** %
Current Sub-Dominant Land Cover: **Crop**

| 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.: | **2,003.0** ft. | **3,003.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **2** **2.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **2,372.2** **63.8** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **1,051.3** ft. **28.3**

| | One Side | Both Sides |
|---|---|---|
| Road: | **502.2** ft. | **0.0** ft. |
| Railroad: | **0.0** ft. | **0.0** ft. |
| Berm: | **549.2** ft. | **0.0** ft. |
| Improved Path: | **0.0** ft. | **0.0** ft. |

6.2 Development: **356.8** ft. **0.0** ft.
6.3 Channel Bars: **No Data**
6.4 Meander Migration: **None**
6.5 Meander Width: **6 ft.** Rato: **1.0**
6.6 Wavelength: **6 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | 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. | 0 N.S. | 2 High | 2 High | 0 N.S. | 1 Low | 16 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T6.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location

1.1 Reach Description: **From the confluence with the main stem the reach extends to the north on the west side of East Rd ending just upstream of the Main St crossing.**

1.2 Towns: **Milton**

1.3 Downstream Latitude: **44.6317864546**

1.3 Downstream Longitude: **-73.1029975789**

Step 2. Stream Type

| | | | |
|---|---|---|---|
| 2.1 Elevation Upstream: | **364** | | |
| 2.1 Elevation Downstream: | **333** | | |
| 2.1 Is Gradient Gentle?: | **No** | | |
| 2.2 Valley Length: | **2,647.0** ft. | **0.50** | Miles |
| 2.3 Valley Slope: | **1.2** | | |
| 2.4 Channel Length: | **2,857.4** ft. | **0.54** | Miles |
| 2.5 Channel Slope: | **1.08 %** | | |
| 2.6 Sinuosity: | **1.08** | | |
| 2.7 Watershed Area: | **0.6** Square Miles | | |
| 2.8 Channel Width: | **10.8** feet | | |
| 2.9 Valley Width: | **391.0** feet | | |
| 2.10 Confinement Ratio: | **36.3** | | |
| 2.10 Confinement Type: | **Very Broad** | | |
| 2.11 Reference Stream Type: | **E** | | |
| Bedform: | **Dune-Ripple** | | |
| Sub-Class Slope: | **None** | | |
| Bed Material: | **Sand** | | |

Step 3. Basin Charateristicts

| | | |
|---|---|---|
| 3.1 Alluvial Fan: | **None** | |
| 3.2 Grade Control: | **None** | |
| 3.3 Dominant Geological Mat.: | **Alluvial** | **44.0** % |
| 3.3 Sub-dom. Geological Mat.: | **Ice-Contact** | |
| 3.4 Valley Slope Left: | **Ext. Steep** | |
| 3.4 Valley Slope Right: | **Steep** | |
| 3.5 Soils | | |
| Hydrologic Group: | **C** | **47.0** % |
| Flooding: | **None/Rare** | **55.0** % |
| Water Table Deep: | **1.5** | **81.0** % |
| Water Table Shallow: | **0.0** | **52.0** % |
| Erodibility: | **slight** | **5.0** % |

7.4 Comments:

**Extensive straightening throughout.**

**Reach T6.01 was segmented into 3 segments T6.01-A (994ft), T6.01-B (460ft), and T6.01-C (1,403ft). Segmentation was done to highlight ponding from beaver activity in T6.01-B and to separate degradation impacts from above and below the ponding. Segment T6.01-C was completely entrenched and incised, while T6.01-A had a lower degree of incision and**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed

| | | |
|---|---|---|
| Historic Land Cover: | **Field** | |
| Current Dominant Land Cover: | **Forest** | **46.0** % |
| Current Sub-Dominant Land Cover: | **Crop** | |

4.2 Corridor

| | | |
|---|---|---|
| Historic Land Cover:: | **Field** | |
| Current Dominant Land Cover: | **Crop** | **32.0** % |
| Current Sub-Dominant Land Cover: | **Field** | |

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **51-100** |
| Sub-dominant: | **51-100** | **0-25** |
| Length w / less than 25 ft.: | **2,098.0** ft. | **756.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

| | | | |
|---|---|---|---|
| 5.1 Flow Regulation - (old): | **None** | | |
| Type: | **None** | | |
| Use: | | | |
| 5.2 Bridges and Culverts: | **2** | **2.7** % | |
| 5.3 Bank Armoring: | **0.0** | **0.0** % | |
| Left: | **0.0** ft. | Right: | **0.0** ft. |
| 5.4 Channel Straightening: | **2,537.3** | **88.8** % | |
| 5.5 Dredging History: | **Dredging** | | |

Step 6. Floodplain Modifications

| | | |
|---|---|---|
| 6.1 Berms & 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: | **Avulsion** | |
| 6.5 Meander Width: | **10 ft.** Rato: | **1.0** |
| 6.6 Wavelength: | **10 ft.** Ratio: | **1.0** |

Step 7. Windshield Survey

| | | |
|---|---|---|
| 7.1 Bank Erosion: | **493.7** | ft |
| 7.2 Bank Height: | **3** | 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 2 High | 0 N.S. | 0 N.S. | 0 N.S. | 2 High | 2 High | 0 Unk. | 0 N.S. | 1 Low | 1 Low | 2 High | 2 High | 1 Low | 1 Low | 18 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T6.02**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From the Main St Crossing the reach extends to the north, ending 600 feet downstream of the North Rd crossing.**

1.1 Reach Description:
1.2 Towns: **Milton**
1.3 Downstream Latitude: **44.6389377007**
1.3 Downstream Longitude: **-73.1015312573**

Step 2. Stream Type

2.1 Elevation Upstream: **370**
2.1 Elevation Downstream: **364**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **571.0** ft. **0.11** Miles
2.3 Valley Slope: **1.1**
2.4 Channel Length: **609.7** ft. **0.12** Miles
2.5 Channel Slope: **0.98 %**
2.6 Sinuosity: **1.07**
2.7 Watershed Area: **0.4** Square Miles
2.8 Channel Width: **8.4** feet
2.9 Valley Width: **143.0** feet
2.10 Confinement Ratio: **16.9**
2.10 Confinement Type: **Very Broad**
2.11 Reference Stream Type: **E**
Bedform: **Dune-Ripple**
Sub-Class Slope: **None**
Bed Material: **Sand**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Alluvial** **76.0** %
3.3 Sub-dom. Geological Mat.: **Till**
3.4 Valley Slope Left: **Steep**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **97.0** %
Flooding: **Frequent** **76.0** %
Water Table Deep: **1.5** **76.0** %
Water Table Shallow: **0.0** **76.0** %
Erodibility: **slight** **22.0** %
7.4 Comments:
**Extensive straightening.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **70.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **58.0** %
Current Sub-Dominant Land Cover: **Forest**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **>100** |
| Sub-dominant: | **None** | **0-25** |
| Length w / less than 25 ft.: | **609.0** ft. | **95.0** ft. |

4.4 Ground Water Inputs: **Abundant**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **0** **0.0** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **609.2** **99.9** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & 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: **577.4** ft. **0.0** ft.
6.3 Channel Bars: **None**
6.4 Meander Migration: **Avulsion**
6.5 Meander Width: **8 ft.** Rato: **1.0**
6.6 Wavelength: **8 ft.** Ratio: **1.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **68.62** ft
7.2 Bank Height: **1** 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 | 7.3 | 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. | 1 Low | 2 High | 2 High | 1 Low | 0 N.S. | 16 |

# Malletts Creek

## Phase 1 - Reach Summary Report

Basin: **Northern Champlain**
Stream Name:
Topo Maps: **MILTON**
Watershed: **Lewis Creek, Little Otter, Lake Champlain**
Sub-watershed: **Malletts Bay**

Reach ID: **T6.S1.01**
SGAT Version: **4.56**
Date Last Edited: **February, 10 2011**
QA Status: **Themes have been checked**
Is Reach An Impoundment?: **No**

Step 1. Reach Location **From confluence with T6.01 reach extends to the east along Westford Rd.**

1.1 Reach Description:
1.2 Towns: **Milton**
1.3 Downstream Latitude: **44.638885915**
1.3 Downstream Longitude: **-73.1014142886**

Step 2. Stream Type

2.1 Elevation Upstream: **414**
2.1 Elevation Downstream: **364**
2.1 Is Gradient Gentle?: **No**
2.2 Valley Length: **880.0** ft. **0.17** Miles
2.3 Valley Slope: **5.7**
2.4 Channel Length: **895.1** ft. **0.17** Miles
2.5 Channel Slope: **5.59 %**
2.6 Sinuosity: **1.02**
2.7 Watershed Area: **0.1** Square Miles
2.8 Channel Width: **4.3** feet
2.9 Valley Width: **15.0** feet
2.10 Confinement Ratio: **3.5**
2.10 Confinement Type: **Semi-confined**
2.11 Reference Stream Type: **B**
Bedform: **Riffle-Pool**
Sub-Class Slope: **a**
Bed Material: **Gravel**

Step 3. Basin Charateristicts

3.1 Alluvial Fan: **None**
3.2 Grade Control: **None**
3.3 Dominant Geological Mat.: **Till** **51.0** %
3.3 Sub-dom. Geological Mat.: **Glacial Lake**
3.4 Valley Slope Left: **Hilly**
3.4 Valley Slope Right: **Steep**
3.5 Soils
Hydrologic Group: **C** **98.0** %
Flooding: **None/Rare** **89.0** %
Water Table Deep: **2.5** **88.0** %
Water Table Shallow: **1.5** **88.0** %
Erodibility: **Severe** **51.0** %
7.4 Comments:

**Tributary is more of a wetland drainage to the development than a fortified stream channel. The stream type designation was chosen to best represent to slope, but the valley is poorly defined.**

Step 4. Land Cover - Reach Hydrology

4.1 Watershed
Historic Land Cover: **Field**
Current Dominant Land Cover: **Forest** **37.0** %
Current Sub-Dominant Land Cover: **Crop**
4.2 Corridor
Historic Land Cover:: **Field**
Current Dominant Land Cover: **Crop** **25.0** %
Current Sub-Dominant Land Cover: **Urban**

| 4.3 Riparian Buffer | Left Bank | Right Bank |
|---|---|---|
| Dominant: | **0-25** | **0-25** |
| Sub-dominant: | **None** | **None** |
| Length w / less than 25 ft.: | **843.0** ft. | **876.0** ft. |

4.4 Ground Water Inputs: **Minimal**

Step 5. Instream Channel Modifications

5.1 Flow Regulation - (old): **None**
Type: **None**
Use:
5.2 Bridges and Culverts: **1** **13.4** %
5.3 Bank Armoring: **0.0** **0.0** %
Left: **0.0** ft. Right: **0.0** ft.
5.4 Channel Straightening: **875.6** **97.8** %
5.5 Dredging History: **None**

Step 6. Floodplain Modifications

6.1 Berms & Roads - old: **366.8** ft. **41.0**

| | One Side | Both Sides |
|---|---|---|
| Road: | **366.8** 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: **None**
6.5 Meander Width: **N/A** Rato: **0.0**
6.6 Wavelength: **N/A** Ratio: **0.0**

Step 7. Windshield Survey

7.1 Bank Erosion: **0** ft
7.2 Bank Height: **No Data** 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 | 7.3 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 High | 2 High | 2 High | 0 N.S. | 1 Low | 0 N.S. | 2 High | 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 | 12 |

# APPENDIX B
## PHASE 2 DATA SUMMARY AND REPORTS
## (INCLUDES CULVERT DATA SUMMARY)

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Malletts Creek Main Stem**
Reach: **M14-A**
Segment Length(ft): **261**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/13/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**

Step 0 - Location: **From reach break at change in confinement to the very large beaver dam 261 feet upstream.**

Step 5 - Notes: **Segment M14-A was assessed to characterize the channel conditions in commonly observed in the areas of beaver activity. Although the upper segment is completely impounded by beaver activity it was necessary to capture the channel geometry where a fluvial system exists. The cross-section that was taken on this segment was the primary thread of the reach, however, many small channels exist to the north where flows travel over the floodplain because of the beaver dam.**

Step 7 - Narrative: **Channel slightly starved of sediment because of beaver dam, but condition is very natural.**

## Step 1. Valley and Floodplain

1.1 Segmentation: **Other Reason**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| | Length (ft) | One Height | Both | Height |
|---|---|---|---|---|
| Berm: | | 0 | 0 | |
| Road: | | 0 | 0 | |
| Railroad: | | 0 | 0 | |
| Imp. Path: | | 0 | 0 | |
| Dev.: | | 0 | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | **Steep** | **Very Steep** |
| Continuous w/ Bank: | **Never** | **Sometimes** |
| Within 1 Bankfull W: | **Never** | **Sometimes** |
| Texture: | **N.E.** | **Sand** |

1.5 Valley Features
Valley Width (ft): **783**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **No**

1.6 Grade Controls: **None**

Stream: **Malletts Creek Main Stem** Reach: **M14-A**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **10.50** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **3.20** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.10** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **440.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **3.20** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **1.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **5.00** | Fine Gravel: | **12.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **41.90** | Sand: | **70.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **17.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **17** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **0.0** | **0.0** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **0.0** | **0.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **26-50** | **51-75** |
| Material Type: | **Silt** | **Silt** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Cohesive** | **Cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Mixed Trees** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Shrubs/Sapling** | **Forest** |
| Sub-dominant | **None** | **Shrubs/Sapling** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: **Malletts Creek Main Stem** Reach: **M14-A**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **1** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** | |
| Mid: | **0** | Delta: | **0** | Flood chutes: | **1** | Avulsion: | **0** | 5.5 Straightening: | **None** |
| Point: | **1** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **0** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **16** | **None** | **No** | Geomorphic Rating | **0.82** |
| 7.2 Channel Aggradation | | **18** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **16** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **16** | **None** | **Yes** | Geomorphic Condition | **Good** |
| Total Score | | **66** | | | Stream Sensitivity | **High** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Malletts Creek Main Stem**
Reach: **M14-B**
Segment Length(ft): **2,518**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date:
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**
Why Not Assessed: **beaver dam**

Step 0 - Location: **From start of the beaver dam impoundment up to the reach break with M15**

Step 5 - Notes: **Segment impounded by beaver activity and only assessed for bank and buffer conditions.**

Step 7 - Narrative:

## Step 1. Valley and Floodplain

1.1 Segmentation: **Other Reason**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| | Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|---|
| Berm: | | 0 | | 0 | |
| Road: | | 0 | | 0 | |
| Railroad: | | 0 | | 0 | |
| Imp. Path: | | 0 | | 0 | |
| Dev.: | | 0 | | 0 | |

| 1.4 Adjacent Side | Left | Right |
|---|---|---|
| Hillside Slope: | Steep | Very Steep |
| Continuous w/ Bank: | Never | Never |
| Within 1 Bankfull W: | Never | Never |
| Texture: | N.E. | N.E. |

1.5 Valley Features
Valley Width (ft): **783**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **No**

1.6 Grade Controls: **None**

Stream: **Malletts Creek Main Stem** Reach: **M14-B**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | | 2.12 Substrate Composition | | Bed: | |
| 2.3 Mean Depth (tf): | | Bedrock: | % | Bar: | |
| 2.4 Floodprone Width (ft.): | | Boulder: | % | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | | Cobble: | % | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | % | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **0.00** | Fine Gravel: | % | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **0.00** | Sand: | % | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **0.00** | Silt and Smaller: | % | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | | Detritus: | % | Reference Stream Type: | |
| 2.10 Riffles Type: | | # Large Woody Debris: | | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Moderate**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **0.0** | **0.0** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **0.0** | **0.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **26-50** | **26-50** |
| Material Type: | **Silt** | **Silt** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Herbaceous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Mass Failures | | |
| Sub-dominant | **None** | **None** | Height | | |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **None** | | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Malletts Creek Main Stem** Reach: **M14-B**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **1** |
| | | (old) Upstrm Flow Reg.: | | Affected Length (ft): | **2518** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | 5.2 Other Features | | Neck Cutoff: | **1** | 5.4 Stream Ford or Animal Crossing: | **No** |
| Mid: | Delta: | Flood chutes: | **1** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | Island: | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **408** |
| Side: | Braiding: **0** | Steep Riffles: | **0** | Trib Rejuv.: | | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | Left | Right |
|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | 6.4 Sediment Deposition: | Stream Gradiant Type | | |
| 6.2 Pool Substrate: | 6.5 Channel Flow Status: | 6.8 Bank Stability: | | |
| 6.3 Pool Variability: | 6.6 Channel Alteration: | 6.9 Bank Vegetation Protection | | |
| Total Score: | 6.7 Channel Sinuosity: | 6.10 Riparian Veg. Zone Width: | | |
| Habitat Rating: | | | | |
| Habitat Stream Condition: | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | Score | STD | Historic | | |
|---|---|---|---|---|---|
| 7.1 Channel Degradation | | | | Geomorphic Rating | |
| 7.2 Channel Aggradation | | | | Channel Evolution Model | |
| 7.3 Widening Channel | | | | Channel Evolution Stage | |
| 7.4 Change in Planforml | | | | Geomorphic Condition | **Good** |
| Total Score | | | | Stream Sensitivity | |

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Malletts Creek Main Stem**
Reach: **M15-A**
Segment Length(ft): **671**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/13/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**
Why Not Assessed: **beaver dam**

Step 0 - Location: **From reach break at confluence with T5.01 to segment break at end of impoundment 671 feet upstream.**

Step 5 - Notes: **Segment impounded by beaver activity and only assessed for bank and buffer conditions.**

Step 7 - Narrative:

## Step 1. Valley and Floodplain

1.1 Segmentation: **Other Reason**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Steep |
| Continuous w/ Bank: | Never | Never |
| Within 1 Bankfull W: | Never | Never |
| Texture: | N.E. | N.E. |

1.5 Valley Features
Valley Width (ft): **351**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **No**

1.6 Grade Controls: **None**

Stream: **Malletts Creek Main Stem** Reach: **M15-A**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on Bed: | |
| 2.2 Max Depth (ft.): | | 2.12 Substrate Composition | | Bar: | |
| 2.3 Mean Depth (tf): | | Bedrock: | % | 2.14 Stream Type | |
| 2.4 Floodprone Width (ft.): | | Boulder: | % | Stream Type: | **E** |
| 2.5 Aband. Floodpn (ft.): | | Cobble: | % | Bed Material: | **Sand** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | % | Subclass Slope: | **None** |
| 2.6 Width/Depth Ratio: | **0.00** | Fine Gravel: | % | Bed Form: | **Dune-Ripple** |
| 2.7 Entrenchment Ratio: | **0.00** | Sand: | % | Field Measured Slope: | |
| 2.8 Incision Ratio: | **0.00** | Silt and Smaller: | % | 2.15 Sub-reach Stream Type | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | | Reference Stream Type: | |
| 2.9 Sinuosity: | | Detritus: | % | Reference Bed Material: | |
| 2.10 Riffles Type: | | # Large Woody Debris: | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Moderate**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **0.0** | **0.0** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **0.0** | **0.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **1-25** |
| Material Type: | **Silt** | **Silt** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Herbaceous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Mass Failures | | |
| Sub-dominant | **None** | **Forest** | Height | | |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **None** | | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Malletts Creek Main Stem** Reach: **M15-A**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **1** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **580** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | | 5.2 Other Features | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | **No** |
| Mid: | Delta: | | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | Island: | | 5.3 Steep Riffles and Head Cuts | Head Cuts: | **0** | Straightening Length (ft.): | **426** |
| Side: | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | |
|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | 6.4 Sediment Deposition: | Stream Gradiant Type | Left | Right |
| 6.2 Pool Substrate: | 6.5 Channel Flow Status: | 6.8 Bank Stability: | | |
| 6.3 Pool Variability: | 6.6 Channel Alteration: | 6.9 Bank Vegetation Protection | | |
| Total Score: | 6.7 Channel Sinuosity: | 6.10 Riparian Veg. Zone Width: | | |
| Habitat Rating: | | | | |
| Habitat Stream Condition: | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | Score | STD | Historic | | |
|---|---|---|---|---|---|
| 7.1 Channel Degradation | | | | Geomorphic Rating | |
| 7.2 Channel Aggradation | | | | Channel Evolution Model | |
| 7.3 Widening Channel | | | | Channel Evolution Stage | |
| 7.4 Change in Planforml | | | | Geomorphic Condition | **Good** |
| Total Score | | | | Stream Sensitivity | |

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Malletts Creek Main Stem**
Reach: **M15-B**
Segment Length(ft): **1,487**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/13/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**
Why Not Assessed: **beaver dam**

Step 0 - Location: **From end of impoundment up to the sharp channel pend several hundred feet upslope of the Kingsbury Road crossing**

Step 5 - Notes: **Channel historically straightened, which dramatically impacted both the overall geomorphic and habitat conditions. Slightly coarser, foreign substrate was observed downstream of the Kingsbury Rd. culvert, which suggest that the previous culvert might have had an erosion problem or a blowout. There is minor channel encroachment near the Kingsbury road crossing, but the driveway does not seem to be significantly impacting the floodplain function.**

Step 7 - Narrative: **Vertical changes in the channel were not observed in the cross-section, however minor incision was noted upstream of Kingsbury Road. Channel straightening has dramatically changed the planform of the segment, and future adjustments will be lateral. Channel is trying to redevelop a more stable planform and additional sinuosity, by eroding the outside meander bends, and some flood chutes and neck cutoffs.**

## Step 1. Valley and Floodplain

1.1 Segmentation: **Other Reason**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | 3 | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Very Steep |
| Continuous w/ Bank: | Never | Sometimes |
| Within 1 Bankfull W: | Never | Sometimes |
| Texture: | N.E. | Sand |

1.5 Valley Features

Valley Width (ft): **351**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **No**

1.6 Grade Controls: **None**

Stream: **Malletts Creek Main Stem** Reach: **M15-B**

## Step 2. Stream Channel

| | | | | | | |
|---|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **18.50** | 2.11 Riffle/Step Spacing: | **140 ft.** | 2.13 Average Largest Particle on | | |
| 2.2 Max Depth (ft.): | **2.40** | 2.12 Substrate Composition | | Bed: | **1.7** | **inches** |
| 2.3 Mean Depth (tf): | **1.95** | Bedrock: | **0.0 %** | Bar: | **1.5** | **inches** |
| 2.4 Floodprone Width (ft.): | **412.50** | Boulder: | **0.0 %** | 2.14 Stream Type | | |
| 2.5 Aband. Floodpn (ft.): | **2.40** | Cobble: | **0.0 %** | Stream Type: | **E** | |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **24.0 %** | Bed Material: | **Gravel** | |
| 2.6 Width/Depth Ratio: | **9.49** | Fine Gravel: | **36.0 %** | Subclass Slope: | **None** | |
| 2.7 Entrenchment Ratio: | **22.30** | Sand: | **36.0 %** | Bed Form: | **Riffle-Pool** | |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **4.0 %** | Field Measured Slope: | | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **10.0 %** | Reference Stream Type: | | |
| 2.10 Riffles Type: | **Complete** | # Large Woody Debris: | **52** | Reference Bed Material: | | |
| | | | | Reference Subclass Slope: | | |
| | | | | Reference Bedform: | | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **87.4** | **62.1** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **4.0** | **3.3** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **Rip-Rap** | **Rip-Rap** | Bank Canopy | | |
| Lower | | | Revetment Length: | **22.5** | **23.3** | Canopy %: | **26-50** | **51-75** |
| Material Type: | **Gravel** | **Gravel** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **51-100** | **>100** |
| Sub-Dominant | **0-25** | **None** |
| W less than 25 | **463** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Deciduous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Pasture** | **Shrubs/Sapling** | Mass Failures | | **21.07** |
| Sub-dominant | **Shrubs/Sapling** | **Forest** | Height | | **10.0** |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **One** | **10.0** | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Malletts Creek Main Stem** Reach: **M15-B**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **14** | **Yes** | **Yes** | **Yes** | **Yes** | **Deposition Below** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **2** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **0** | Delta: | **0** | Flood chutes: | **1** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | **6** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **1,450** |
| Side: | **4** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **11** | **None** | **Yes** | Geomorphic Rating | **0.57** |
| 7.2 Channel Aggradation | | **11** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **13** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **11** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **46** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Malletts Creek Main Stem
Reach: M16-0
Segment Length(ft): 3,142
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/13/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From the reach break upstream of the Kingsbury Road Crossing up to a change in slope at the confluence with tributary T6.01.**

Step 5 - Notes: **Reach has had significant historical beaver activity, which has led to some instability in the form of minor headcuts. However, these changes are natural and would be expected after major base level drops when beaver dams breach. The channel has is currently degrading through the substrate that has aggraded behind these breached beaver dams. At the upstream end near the confluence with T6.01 and M17 the channel receives a high sediment load from the high energy channel in M17-A/M17-B. This sediment appears aggrading rapidly, because of the historical channel straightening in segment M17-A. C-type was chosen for this reach because some areas with wider geometry were noted in the field. The current width-to-depth ratio is within the confidence limits of the Rosgen designations for C-type channels.**

Step 7 - Narrative: **Degradation through sediment that has aggraded behind (breached) beaver dams and planform shifts. These impacts are natural and CEM remains in stage I.**

## Step 1. Valley and Floodplain

1.1 Segmentation: None
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features

Valley Width (ft): 248
Width Determination: Measured
Confinement Type: VB
In Rock Gorge: No
Human Caused Change in Valley Width?: No

1.6 Grade Controls: None

Stream: **Malletts Creek Main Stem** Reach: **M16-0**

## Step 2. Stream Channel

| | | | | | | |
|---|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **19.50** | 2.11 Riffle/Step Spacing: | **135 ft.** | 2.13 Average Largest Particle on | | |
| 2.2 Max Depth (ft.): | **3.00** | 2.12 Substrate Composition | | Bed: | **12** | **inches** |
| 2.3 Mean Depth (tf): | **1.92** | Bedrock: | **0.0 %** | Bar: | **3** | **inches** |
| 2.4 Floodprone Width (ft.): | **107.00** | Boulder: | **6.0 %** | 2.14 Stream Type | | |
| 2.5 Aband. Floodpn (ft.): | **3.70** | Cobble: | **10.0 %** | Stream Type: | **C** | |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **42.0 %** | Bed Material: | **Gravel** | |
| 2.6 Width/Depth Ratio: | **10.16** | Fine Gravel: | **16.0 %** | Subclass Slope: | **None** | |
| 2.7 Entrenchment Ratio: | **5.49** | Sand: | **22.0 %** | Bed Form: | **Riffle-Pool** | |
| 2.8 Incision Ratio: | **1.23** | Silt and Smaller: | **4.0 %** | Field Measured Slope: | | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **10.0 %** | Reference Stream Type: | | |
| 2.10 Riffles Type: | **Complete** | # Large Woody Debris: | **73** | Reference Bed Material: | | |
| | | | | Reference Subclass Slope: | | |
| | | | | Reference Bedform: | | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **241.2** | **283.9** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **3.1** | **3.6** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **26-50** | **51-75** |
| Material Type: | **Gravel** | **Gravel** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **0-25** | **None** |
| W less than 25 | **320** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Herbaceous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-dominant | **Forest** | **Forest** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: **Malletts Creek Main Stem** Reach: **M16-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **1** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | Neck Cutoff: | **1** | 5.4 Stream Ford or Animal Crossing: | **No** | | |
| Mid: | **12** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **1** | 5.5 Straightening: | **None** |
| Point: | **5** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **3** | Straightening Length (ft.): | **0** |
| Side: | **11** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **13** | **None** | **No** | Geomorphic Rating | **0.65** |
| 7.2 Channel Aggradation | | **14** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **13** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **12** | **None** | **No** | Geomorphic Condition | **Good** |
| Total Score | | **52** | | | Stream Sensitivity | **Very High** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Malletts Creek Main Stem
Reach: M17-A
Segment Length(ft): 916
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/28/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From confluence with T6.01 downstream of East Road to approximately 400 feet upstream of the East Rd Crossing.**

Step 5 - Notes: **Segment historically had a single thread that meandered in the open valley, however, straightening altered the channel planform and now the system has a high transport capacity. Large bars have formed at the top of the downstream reach as a result of this transport.**

Step 7 - Narrative: **Vertical changes in the channel were not observed in the cross-section, however minor incision was noted upstream and downstream of the cross-section location. Channel straightening has dramatically changed the planform of the segment, and future adjustments will be lateral.**

**The degradation STD refers to the departure from a C-type channel to an E-type. As more sediment aggrades and sinuosity increases this segment will likely regain C-type morphology.**

## Step 1. Valley and Floodplain

1.1 Segmentation: Other Reason
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 110 | 8 | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 215 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Hilly | Hilly |
| Continuous w/ Bank: | Never | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | Mixed | Mixed |

1.5 Valley Features

| | |
|---|---|
| Valley Width (ft): | 420 |
| Width Determination: | Measured |
| Confinement Type: | VB |
| In Rock Gorge: | No |
| Human Caused Change in Valley Width?: | No |

1.6 Grade Controls: None

Stream: **Malletts Creek Main Stem** Reach: **M17-A**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **19.00** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.70** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.18** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **617.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **3.00** | Cobble: | **32.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **36.0 %** | Bed Material: | **Gravel** |
| 2.6 Width/Depth Ratio: | **8.72** | Fine Gravel: | **13.0 %** | Subclass Slope: | **b** |
| 2.7 Entrenchment Ratio: | **32.47** | Sand: | **19.0 %** | Bed Form: | **Plane Bed** |
| 2.8 Incision Ratio: | **1.11** | Silt and Smaller: | **0.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **No** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Low** | Detritus: | **15.0 %** | Reference Stream Type: | **C** |
| 2.10 Riffles Type: | **Eroded** | # Large Woody Debris: | **7** | Reference Bed Material: | **Gravel** |
| | | | | Reference Subclass Slope: | **None** |
| | | | | Reference Bedform: | **Riffle-Pool** |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **100.0** | **44.7** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Mix** | **Mix** | Erosion Height (ft.): | **3.0** | **3.0** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **51-75** | **51-75** |
| Material Type: | **Gravel** | **Gravel** | | | | Mid-Channel Canopy: | **Closed** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **51-100** | **51-100** |
| Sub-Dominant | **>100** | **>100** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Deciduous** | **Deciduous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Mass Failures | | **47.64** |
| Sub-dominant | **Forest** | **Residential** | Height | | **8.0** |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **One** | **8.0** | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Malletts Creek Main Stem** Reach: **M17-A**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Minimal** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **1** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **11** | **Yes** | **Yes** | **Yes** | **Yes** | **Scour Below** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **0** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **1** | 5.5 Straightening: | **Straightening** |
| Point: | **2** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **733** |
| Side: | **1** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **12** | **Other** | **Yes** | Geomorphic Rating | **0.63** |
| 7.2 Channel Aggradation | | **14** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **13** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **11** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **50** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Malletts Creek Main Stem
Reach: M17-B
Segment Length(ft): 4,197
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/28/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From segment break upslope of the east road crossing up to the reach break with M18 at immediately upstream of the Forest Rd. Crossing.**

Step 5 - Notes: **Segment is stable with some natural braiding noted where the channel confinement changes to a narrow setting. These areas were not worth segmenting out because they were frequent and short, however, the sub-dominant bedform was selected as "braided." Habitat was excellent with many brook trout observed.**

**Where the valley widens the channel becomes less entrenched (but likely still close to 2.2 ratio in many cases) with a higher width-to-depth ratio (WDR) and where the valley pinches there is greater entrenchment and the WDR is lower. In some short stretches (as captured in the cross-sections), the entrenchment and width to depth ratios may be on the cusp of a "C" type, while in other areas they might suggest and "A" type (with low width to depth ratios). However, the average channel slope is 4.2%, and field observations of the entire reach suggest that B-type geometry best characterizes the channel form.**

**Flood chutes were naturally occurring and not indicative of severe planform adjustments.**

Step 7 - Narrative: **See Step 5.**

## Step 1. Valley and Floodplain

1.1 Segmentation: Other Reason
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

| 1.4 Adjacent Side | Left | Right |
|---|---|---|
| Hillside Slope: | Extr.Steep | Extr.Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | Mixed | Mixed |

1.5 Valley Features
Valley Width (ft): 75
Width Determination: Measured
Confinement Type: SC
In Rock Gorge: No
Human Caused Change in Valley Width?: No

1.6 Grade Controls:

| Type | Location | Total Height | Total Height Above Water | Photo Taken? | GPS Taken? |
|---|---|---|---|---|---|
| Ledge | Mid-segment | 2.0 | 1.0 | Yes | |
| Waterfall | Mid-segment | 10.0 | 8.0 | Yes | |
| Waterfall | Mid-segment | 15.0 | 14.0 | Yes | |

Stream: **Malletts Creek Main Stem** Reach: **M17-B**

## Step 2. Stream Channel

| | | | | | | |
|---|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **21.50** | 2.11 Riffle/Step Spacing: | **70 ft.** | 2.13 Average Largest Particle on | | |
| 2.2 Max Depth (ft.): | **2.85** | 2.12 Substrate Composition | | Bed: | **13.2** | **inches** |
| 2.3 Mean Depth (tf): | **2.22** | Bedrock: | **0.0 %** | Bar: | **4.5** | **inches** |
| 2.4 Floodprone Width (ft.): | **47.00** | Boulder: | **6.0 %** | 2.14 Stream Type | | |
| 2.5 Aband. Floodpn (ft.): | **2.85** | Cobble: | **45.0 %** | Stream Type: | **B** | |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **27.0 %** | Bed Material: | **Cobble** | |
| 2.6 Width/Depth Ratio: | **9.68** | Fine Gravel: | **10.0 %** | Subclass Slope: | **a** | |
| 2.7 Entrenchment Ratio: | **2.19** | Sand: | **12.0 %** | Bed Form: | **Step-Pool** | |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **0.0 %** | Field Measured Slope: | | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **20.0 %** | Reference Stream Type: | **B** | |
| 2.10 Riffles Type: | **Complete** | # Large Woody Debris: | **169** | Reference Bed Material: | **Cobble** | |
| | | | | Reference Subclass Slope: | **a** | |
| | | | | Reference Bedform: | **Step-Pool** | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **45.2** | **151.1** | Dominant: | **Deciduous** | **Deciduous** |
| Material Type: | **Mix** | **Mix** | Erosion Height (ft.): | **4.0** | **3.2** | Sub-dominant: | **Coniferous** | **Coniferous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **76-100** | **76-100** |
| Material Type: | **Boulder/Cobble** | **Boulder/Cobble** | | | | Mid-Channel Canopy: | **Closed** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Mixed Trees** | **Mixed Trees** |
| Sub-Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Forest** | **Forest** | Mass Failures | **216.57** | **59.96** |
| Sub-dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Height | **30.9** | **40.0** |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **Multiple** | **29.5** | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Malletts Creek Main Stem** Reach: **M17-B**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Minimal** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **7** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | | Affected Length (ft): | **0** |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **9.5** | **Yes** | **Yes** | **Yes** | **Yes** | **Deposition Above** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** | |
| Mid: | **3** | Delta: | **0** | Flood chutes: | **3** | Avulsion: | **0** | 5.5 Straightening: | **None** |
| Point: | **3** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **0** |
| Side: | **0** | Braiding: | **2** | Steep Riffles: | **1** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Confined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **18** | **None** | **No** | Geomorphic Rating | **0.82** |
| 7.2 Channel Aggradation | | **16** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **16** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **16** | **None** | **No** | Geomorphic Condition | **Good** |
| Total Score | | **66** | | | Stream Sensitivity | **Moderate** |

# Phase 2 Segment Summary Report Malletts Creek



Stream:
Reach: **T6.01-A**
Segment Length(ft): **994**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/28/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**

Step 0 - Location: **From reach break at confluence with Main Stem reach M17-A up to large beaver dam near power line right of way.**

Step 5 - Notes: **Segment has been historically impacted by extensive beaver activity (per 2004 aerial imagery) and is now adjusting to changes in base level as old beaver dams breach and new ones are formed. Some haying was conducted in the past along the east corridor adjacent to East Road, but no haying was done this year. Several small headcuts were observed (as a result of beaver activity), but incision is only minor and the floodplain is still accessible, especially in the lower reach. The incision observed seemed to be degrading material that was previously aggraded by past beaver activity.**

Step 7 - Narrative: **Some historic straightening has produced limited incision because of extensive beaver activity in the lower reach.**

## Step 1. Valley and Floodplain

1.1 Segmentation: **Flow Status**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

| 1.4 Adjacent Side | Left | Right |
|---|---|---|
| Hillside Slope: | Flat | Extr.Steep |
| Continuous w/ Bank: | Never | Never |
| Within 1 Bankfull W: | Never | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features
Valley Width (ft): **340**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **Yes**

1.6 Grade Controls: **None**

Stream: Reach: **T6.01-A**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **8.60** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.40** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **1.59** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **339.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **2.97** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **5.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **5.41** | Fine Gravel: | **15.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **39.42** | Sand: | **62.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.24** | Silt and Smaller: | **18.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **21** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Undercut**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **173.3** | **82.4** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **2.7** | **3.0** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **26-50** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **51-100** | **None** |
| W less than 25 | **234** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Mixed Trees** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-dominant | **Hay** | **Forest** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: Reach: **T6.01-A**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **1** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** | |
| Mid: | **0** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | **6** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **2** | Straightening Length (ft.): | **674** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **Dredging** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **10** | **None** | **Yes** | Geomorphic Rating | **0.63** |
| 7.2 Channel Aggradation | | **15** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **13** | **None** | **No** | Channel Evolution Stage | **II** |
| 7.4 Change in Planforml | | **12** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **50** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream:
Reach: **T6.01-B**
Segment Length(ft): **460**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/28/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**
Why Not Assessed: **beaver dam**

Step 0 - Location: **The impounded section begins at the power line ROW and ends at the tributary which enters from the East.**

Step 5 - Notes: **Segment is impacted by beaver activity and was only assessed for bank and buffer conditions.**

Step 7 - Narrative:

## Step 1. Valley and Floodplain

1.1 Segmentation: **Flow Status**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| | Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|---|
| Berm: | | 0 | | 0 | |
| Road: | | 0 | | 0 | |
| Railroad: | | 0 | | 0 | |
| Imp. Path: | | 0 | | 0 | |
| Dev.: | | 0 | | 0 | |

| 1.4 Adjacent Side | Left | Right |
|---|---|---|
| Hillside Slope: | **Flat** | **Extr.Steep** |
| Continuous w/ Bank: | **Never** | **Never** |
| Within 1 Bankfull W: | **Never** | **Sometimes** |
| Texture: | **N.E.** | **N.E.** |

1.5 Valley Features
Valley Width (ft): **290**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **Yes**

1.6 Grade Controls: **None**

Stream: Reach: **T6.01-B**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on Bed: | |
| 2.2 Max Depth (ft.): | | 2.12 Substrate Composition | | Bar: | |
| 2.3 Mean Depth (tf): | | Bedrock: | % | 2.14 Stream Type | |
| 2.4 Floodprone Width (ft.): | | Boulder: | % | Stream Type: | **G** |
| 2.5 Aband. Floodpn (ft.): | | Cobble: | % | Bed Material: | **Sand** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | % | Subclass Slope: | **c** |
| 2.6 Width/Depth Ratio: | **0.00** | Fine Gravel: | % | Bed Form: | **Plane Bed** |
| 2.7 Entrenchment Ratio: | **0.00** | Sand: | % | Field Measured Slope: | |
| 2.8 Incision Ratio: | **0.00** | Silt and Smaller: | % | 2.15 Sub-reach Stream Type | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | | Reference Stream Type: | |
| 2.9 Sinuosity: | | Detritus: | % | Reference Bed Material: | |
| 2.10 Riffles Type: | | # Large Woody Debris: | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Moderate**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **0.0** | **0.0** | Dominant: | **Herbaceous** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **0.0** | **0.0** | Sub-dominant: | **Invasives** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **0** | **51-75** |
| Material Type: | **Silt** | **Silt** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Cohesive** | **Cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **0-25** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **459** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Shrubs/Sapling** |
| Sub-Dominant | **Invasives** | **Deciduous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Hay** | **Shrubs/Sapling** | Mass Failures | | |
| Sub-dominant | **None** | **Forest** | Height | | |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **None** | | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: Reach: **T6.01-B**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **1** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **450** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | 5.2 Other Features | | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | **No** |
| Mid: | Delta: | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | Island: | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **460** |
| Side: | Braiding: **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **Dredging** |

## Step 6. Rapid Habitat Assessment Data

| | | | | |
|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | 6.4 Sediment Deposition: | Stream Gradiant Type | Left | Right |
| 6.2 Pool Substrate: | 6.5 Channel Flow Status: | 6.8 Bank Stability: | | |
| 6.3 Pool Variability: | 6.6 Channel Alteration: | 6.9 Bank Vegetation Protection | | |
| Total Score: | 6.7 Channel Sinuosity: | 6.10 Riparian Veg. Zone Width: | | |
| Habitat Rating: | | | | |
| Habitat Stream Condition: | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | Score | STD | Historic | | |
|---|---|---|---|---|---|
| 7.1 Channel Degradation | | | | Geomorphic Rating | |
| 7.2 Channel Aggradation | | | | Channel Evolution Model | |
| 7.3 Widening Channel | | | | Channel Evolution Stage | |
| 7.4 Change in Planforml | | | | Geomorphic Condition | **Fair** |
| Total Score | | | | Stream Sensitivity | |

# Phase 2 Segment Summary Report Malletts Creek



Stream:
Reach: T6.01-C
Segment Length(ft): 1,403
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/28/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From tributary entering from the east to immediately upstream of the Main Street Crossing.**

Step 5 - Notes: **Extensive dredging and channel straightening with little buffer resistance has led to a highly incised G-type channel with low slope. It seems probable that a large headcut migrated upstream causing the incision, because three small headcuts were observed downstream of the Main St crossing. These features were armored with coarse material and the incision reduced dramatically. Both sides of the channel were likely healthy, functioning wetlands, until the base level drop in water elevation caused the adjacent floodplain (wetland) to dry. Additional erosion and channel migration is anticipated.**

Step 7 - Narrative: **Channel already incised and in late stage II of the CEM. Segment will likely enter stage III of the CEM and experience widening and planform shifts in the future.**

## Step 1. Valley and Floodplain

1.1 Segmentation: **Channel Dimensions**

1.2 Alluvial Fan: **None**

1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Hilly | Very Steep |
| Continuous w/ Bank: | Never | Never |
| Within 1 Bankfull W: | Never | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features

Valley Width (ft): 215
Width Determination: Measured
Confinement Type: VB
In Rock Gorge: No
Human Caused Change in Valley Width?: No

1.6 Grade Controls: None

Stream: Reach: **T6.01-C**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **8.80** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.15** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **0.95** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **14.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **5.95** | Cobble: | **0.0 %** | Stream Type: | **G** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **11.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **9.26** | Fine Gravel: | **21.0 %** | Subclass Slope: | **c** |
| 2.7 Entrenchment Ratio: | **1.59** | Sand: | **60.0 %** | Bed Form: | **Plane Bed** |
| 2.8 Incision Ratio: | **2.77** | Silt and Smaller: | **8.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Low** | Detritus: | **10.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **9** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Undercut**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **212.7** | **25.3** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **3.5** | **4.0** | Sub-dominant: | **Bare** | **Invasives** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **0** | **1-25** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **0-25** | **0-25** |
| Sub-Dominant | **None** | **26-50** |
| W less than 25 | **1,403** | **756** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Herbaceous** |
| Sub-Dominant | **Invasives** | **Invasives** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Hay** | **Hay** |
| Sub-dominant | **None** | **Shrubs/Sapling** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: Reach: **T6.01-C**

## Step 4. Flow & Flow Modifiers

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | | | |
| 4.2 Adjacent Wetlands: | **Minimal** | Flow Reg. Use: | | Field Ditch: | **1** | Road Ditch: | **0** |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | **0** | Tile Drain: | **0** |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | **0** | Urb Strm Wtr Pipe: | **0** |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | | **0** | |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | | **0** | |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **8** | **Yes** | **Yes** | **Yes** | **Yes** | **Scour Above** |
| **Instream Culvert** | **5** | **Yes** | **Yes** | **Yes** | **Yes** | **Scour Above,Scour Below** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **1** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **1** | 5.5 Straightening: | **Straightening** |
| Point: | **1** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **3** | Straightening Length (ft.): | **1,403** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **Dredging** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **3** | **E to G** | **No** | Geomorphic Rating | **0.44** |
| 7.2 Channel Aggradation | | **14** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **9** | **None** | **No** | Channel Evolution Stage | **II** |
| 7.4 Change in Planforml | | **9** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **35** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream:
Reach: T6.02-0
Segment Length(ft): 609
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/28/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From upstream of the Main Street crossing to approximately 700 feet downstream of the North Road crossing.**

Step 5 - Notes: **The Hunting Ridge Lane development area upslope may lack proper stormwater management practices and could be increasing the flashiness of the stream. The increased impervious cover can cause water to rapidly runoff into the tributary carrying sediment and causing planform shifts in this reach. One avulsion was noted in reach T6.02. A minor knickpoint was observed in the lower reach just upstream of the culvert crossing. This feature will not likely migrate because of the large willow tree's roots that cover the stream channel. This feature may actually be a result of the small channel formed over the bulging willow roots (growing out into the watercourse) – it is not a feature of concern with respect to future channel adjustments.**

**Much of the lower portion of the reach is behaving more like a wetland than a channel. Flow is diffuse and broad where the vegetation is entirely herbaceous. The wetland becomes a defined channel upstream where the vegetation becomes wooded.**

Step 7 - Narrative: **Vertical changes in the channel (with exception of a small knickpoint) were not observed in the cross-section. Channel adjustments have largely been lateral in this reach due to changes in upslope hydrology. See Step 5 for further narrative. In the absence of channel incision or abandoned floodplain, CEM stage I was chosen.**

## Step 1. Valley and Floodplain

1.1 Segmentation: None
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 577 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Hilly | Hilly |
| Continuous w/ Bank: | Never | Never |
| Within 1 Bankfull W: | Never | Never |
| Texture: | N.E. | N.E. |

1.5 Valley Features

| | |
|---|---|
| Valley Width (ft): | 143 |
| Width Determination: | Measured |
| Confinement Type: | VB |
| In Rock Gorge: | No |
| Human Caused Change in Valley Width?: | No |

1.6 Grade Controls: None

Stream: Reach: **T6.02-0**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **7.00** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **1.40** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **0.78** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **135.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **1.40** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **0.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **8.97** | Fine Gravel: | **5.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **19.29** | Sand: | **65.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **30.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **No** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Low** | Detritus: | **20.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **13** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **68.6** | **0.0** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **1.0** | **0.0** | Sub-dominant: | **Shrubs/Sapling** | **Deciduous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **26-50** |
| Material Type: | **Silt** | **Silt** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **0-25** | **>100** |
| Sub-Dominant | **None** | **0-25** |
| W less than 25 | **609** | **95** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Deciduous** |
| Sub-Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Residential** | **Forest** | Mass Failures | | |
| Sub-dominant | **Bare** | **Residential** | Height | | |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **None** | | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: Reach: **T6.02-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **1** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **0** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **2** | 5.5 Straightening: | **Straightening** |
| Point: | **0** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **1** | Straightening Length (ft.): | **609** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **8** | **None** | **No** | Geomorphic Rating | **0.54** |
| 7.2 Channel Aggradation | | **15** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **14** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **6** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **43** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Allen (Petty) Brook
Reach: T1.02-0
Segment Length(ft): 1,602
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/12/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From just upstream of the Route 7 Crossing to the reach break at the confluence with tributary T1.S1.**

Step 5 - Notes: **Reach is in good shape and well-buffered with a very accessible floodplain throughout. Cross-section was taken at a location parallel to the valley wall so the extent of the VW was measured using a range finder.**

Step 7 - Narrative: **This channel was extensively straightened and pushed up the valley wall to the southeast. Straightening occurred in ~60% of reach. Although there was no obvious evidence of abandoned terraces and only minor incision in the cross-section, anthropogenic manipulation of the planform will cause future adjustments to be lateral.**

## Step 1. Valley and Floodplain

1.1 Segmentation: None
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Extr.Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features

| | |
|---|---|
| Valley Width (ft): | 305 |
| Width Determination: | Measured |
| Confinement Type: | VB |
| In Rock Gorge: | No |
| Human Caused Change in Valley Width?: | No |

1.6 Grade Controls: None

Stream: **Allen (Petty) Brook** Reach: **T1.02-0**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **16.40** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **3.85** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.49** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **190.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **4.35** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **0.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **6.59** | Fine Gravel: | **5.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **11.59** | Sand: | **60.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.13** | Silt and Smaller: | **35.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **No** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **High** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **3** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **105.5** | **76.6** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Silt** | **Silt** | Erosion Height (ft.): | **2.0** | **2.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **1-25** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **51-100** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Herbaceous** |
| Sub-Dominant | **Mixed Trees** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Mass Failures | | |
| Sub-dominant | **Forest** | **Commercial** | Height | | |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **None** | | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Allen (Petty) Brook** Reach: **T1.02-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **3** |
| | | (old) Upstrm Flow Reg.: | | Affected Length (ft): | **400** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **1** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **1** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | **4** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **945** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **15** | **None** | **No** | Geomorphic Rating | **0.79** |
| 7.2 Channel Aggradation | | **16** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **16** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **16** | **None** | **No** | Geomorphic Condition | **Good** |
| Total Score | | **63** | | | Stream Sensitivity | **High** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Allen (Petty) Brook
Reach: T1.03-0
Segment Length(ft): 2,706
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/12/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From the reach break at the confluence with T1.S1 up to the confluence with T1.S2**

Step 5 - Notes: **The lower portion of the reach has some buffer impacts on the left side, but otherwise the reach is well buffered. The crossing at Coon Hill Road has several problems. The culvert is undersized which is causing erosion and scour downstream. Also, the water backs up upstream causing aggradation and bank scour. This culvert is a high-priority for replacement.**

Step 7 - Narrative: **Channel has some adjustments associated with historical channel straightening and the undersized structure at Coon Hill Road.**

**Prior incision as observed in the small bench noted in the cross-section has arrested by small areas of cohesive clay in the channel. Widening will follow as the channel begins to regain planform and stability. CEM stage III best describes the processes observed in the field.**

## Step 1. Valley and Floodplain

1.1 Segmentation: None

1.2 Alluvial Fan: None

1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Extr.Steep | Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | N.E. | Silt/Clay |

1.5 Valley Features

Valley Width (ft): 191
Width Determination: Measured
Confinement Type: VB
In Rock Gorge: No
Human Caused Change in Valley Width?: No

1.6 Grade Controls: None

Stream: **Allen (Petty) Brook** Reach: **T1.03-0**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **17.00** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **3.90** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.81** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **167.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **4.60** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **0.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **6.05** | Fine Gravel: | **5.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **9.82** | Sand: | **85.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.18** | Silt and Smaller: | **10.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **82** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Undercut**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **311.6** | **429.8** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Silt** | **Silt** | Erosion Height (ft.): | **3.4** | **4.2** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **26-50** | **26-50** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **0-25** | **51-100** |
| W less than 25 | **983** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Herbaceous** | **Herbaceous** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-dominant | **Hay** | **Forest** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **Multiple** | **8.0** |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | **63.67** |
| Height | | **8.0** |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: **Allen (Petty) Brook** Reach: **T1.03-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **2** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **5** | **Yes** | **Yes** | **Yes** | **Yes** | **Deposition Above,Deposition Below,Scour Above,Scour Below** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **1** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **2** | Delta: | **0** | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | | **Straightening** |
| Point: | **11** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | | **607** |
| Side: | **2** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

| | Score | STD | Historic | | |
|---|---|---|---|---|---|
| 7.1 Channel Degradation | **14** | **None** | **No** | Geomorphic Rating | **0.57** |
| 7.2 Channel Aggradation | **10** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | **12** | **None** | **No** | Channel Evolution Stage | **III** |
| 7.4 Change in Planforml | **10** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | **46** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Allen (Petty) Brook
Reach: T1.04-0
Segment Length(ft): 5,392
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/12/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From the large beaver dam at the confluence with tributary T1.S2**

Step 5 - Notes: **The lower half of the reach has a buffer that is characterized more by shrubs and WADs, while the upper half has more trees. This change in vegetation along with a slight change in valley conditions causes the channel geometry to change slightly. Two cross-sections were taken, however, in both cross-sections the morphology indicated E-type. Throughout the reach the dominant bedform observed is dune-ripple, with only some sections resembling more of a riffle-pool type.**

Step 7 - Narrative: **Reach is mostly stable but shows some areas of incision, widening, and planform shifts - likely caused by historical straightening. Despite the low-moderate incision ratio, there is evidence of abandoned floodplains in this low-gradient reach. Stage III of the CEM best describes the processes observed as this reach begins to widen and develop a stable planform.**

## Step 1. Valley and Floodplain

1.1 Segmentation: None

1.2 Alluvial Fan: None

1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Very Steep |
| Continuous w/ Bank: | Sometimes | Never |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | Silt/Clay | N.E. |

1.5 Valley Features

Valley Width (ft): 146
Width Determination: Measured
Confinement Type: BD
In Rock Gorge: No
Human Caused Change in Valley Width?: No

1.6 Grade Controls: None

Stream: **Allen (Petty) Brook** Reach: **T1.04-0**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **15.20** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **3.20** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.05** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **116.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **4.30** | Cobble: | **8.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **5.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **7.41** | Fine Gravel: | **6.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **7.63** | Sand: | **53.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.34** | Silt and Smaller: | **28.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **170** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **474.7** | **149.5** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **2.8** | **2.6** | Sub-dominant: | **Herbaceous** | **Herbaceous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **26-50** | **26-50** |
| Material Type: | **Silt** | **Clay** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **45** |
| Buffer Vegitation Type | | |
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-Dominant | **Mixed Trees** | **Mixed Trees** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Sub-dominant | **Forest** | **Forest** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **Multiple** | **8.0** |
| Gullies | **Multiple** | **6.0** |

| | Left | Right |
|---|---|---|
| Mass Failures | | **135.64** |
| Height | | **7.7** |
| Gullies Number | **2** | |
| Gullies Length | **300** | |

Stream: **Allen (Petty) Brook** Reach: **T1.04-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: **0** | Road Ditch: **0** |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: **0** | Tile Drain: **0** |
| 4.4 # of Debris Jams: | **3** | Impoundment Loc.: | | Overland Flow: **1** | Urb Strm Wtr Pipe: **0** |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **3** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **1050** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **5** | 5.4 Stream Ford or Animal Crossing: | | **No** |
| Mid: | **2** | Delta: | **0** | Flood chutes: | **2** | Avulsion: | **0** | 5.5 Straightening: | | **Straightening** |
| Point: | **9** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | | **1,154** |
| Side: | **1** | Braiding: | **1** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **11** | **None** | **Yes** | Geomorphic Rating | **0.63** |
| 7.2 Channel Aggradation | | **13** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **12** | **None** | **No** | Channel Evolution Stage | **III** |
| 7.4 Change in Planforml | | **14** | **None** | **No** | Geomorphic Condition | **Fair** |
| Total Score | | **50** | | | Stream Sensitivity | **Extreme** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Allen (Petty) Brook**
Reach: **T1.05-0**
Segment Length(ft): **1,860**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/19/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**

Step 0 - Location: **From the reach break at the VAST trail crossing up the change in confinement.**

Step 5 - Notes: **Reach is in reference condition with excellent dune-ripple formation and abundant habitat.**

Step 7 - Narrative: **Very stable reach with an abundance of wood and excellent riparian buffers.**

## Step 1. Valley and Floodplain

1.1 Segmentation: **None**

1.2 Alluvial Fan: **None**

1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 0 | | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Very Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | Sand | Sand |

1.5 Valley Features

Valley Width (ft): **86**
Width Determination: **Measured**
Confinement Type: **NW**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **No**

1.6 Grade Controls: **None**

Stream: **Allen (Petty) Brook** Reach: **T1.05-0**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **14.00** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.90** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **2.07** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **87.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **2.90** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **0.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **6.76** | Fine Gravel: | **7.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **6.21** | Sand: | **77.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **16.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Moderate** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **117** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | Left | Right | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | | | Erosion Length (ft.): | **76.0** | **73.3** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **3.0** | **3.0** | Sub-dominant: | **Coniferous** | **Coniferous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **76-100** | **76-100** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Closed** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **0** |
| Buffer Vegitation Type | | |
| Dominant | **Mixed Trees** | **Mixed Trees** |
| Sub-Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Forest** | **Forest** | Mass Failures | | **28.7** |
| Sub-dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Height | | **5.0** |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **One** | **5.0** | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Allen (Petty) Brook** Reach: **T1.05-0**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: **0** | Road Ditch: **0** |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: **0** | Tile Drain: **0** |
| 4.4 # of Debris Jams: | **10** | Impoundment Loc.: | | Overland Flow: **1** | Urb Strm Wtr Pipe: **0** |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | **No** | | |
| Mid: | **0** | Delta: | **1** | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **None** |
| Point: | **16** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **0** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **18** | **None** | **No** | Geomorphic Rating | **0.88** |
| 7.2 Channel Aggradation | | **18** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **17** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **17** | **None** | **No** | Geomorphic Condition | **Reference** |
| Total Score | | **70** | | | Stream Sensitivity | **High** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Allen (Petty) Brook
Reach: T1.06-A
Segment Length(ft): 2,816
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/19/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From reach break at change in confinement up to property restriction upslope of tributary confluence with T1.06.t1.01.**

Step 5 - Notes: **Reach is in excellent condition because of the wide buffer. Future stormwater systems for the development near Route 7 should be monitored as to not impact the great habitat/geomorphically stable reach. Neck cutoffs are natural part of sinuous system and abundant beaver activity.**

Step 7 - Narrative: **Great buffers and abundance of woody debris stabilize the segment. Upper end of segment has less forest cover and some beaver activity. The reduced cover has resulted in some tight meander bends that might be neck-cutoffs soon.**

## Step 1. Valley and Floodplain

1.1 Segmentation: Property Access
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One Height | Both Height |
|---|---|---|
| Berm: | 0 | 0 |
| Road: | 0 | 0 |
| Railroad: | 0 | 0 |
| Imp. Path: | 0 | 0 |
| Dev.: | 0 | 0 |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Very Steep | Very Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | Mixed | Mixed |

1.5 Valley Features

| | |
|---|---|
| Valley Width (ft): | 153 |
| Width Determination: | Measured |
| Confinement Type: | VB |
| In Rock Gorge: | No |
| Human Caused Change in Valley Width?: | No |

1.6 Grade Controls: None

Stream: **Allen (Petty) Brook** Reach: **T1.06-A**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **12.80** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.60** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **1.71** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **127.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **2.60** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **0.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **7.49** | Fine Gravel: | **3.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **9.92** | Sand: | **82.0 %** | Bed Form: | **Dune-Ripple** |
| 2.8 Incision Ratio: | **1.00** | Silt and Smaller: | **15.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Oxbows** | Detritus: | **15.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **236** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Undercut**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **164.9** | **122.8** | Dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **3.0** | **3.1** | Sub-dominant: | **Coniferous** | **Coniferous** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **76-100** | **76-100** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Closed** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **>100** | **>100** |
| Sub-Dominant | **None** | **None** |
| W less than 25 | **0** | **1** |
| Buffer Vegitation Type | | |
| Dominant | **Mixed Trees** | **Mixed Trees** |
| Sub-Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right | | Left | Right |
|---|---|---|---|---|---|
| Dominant | **Forest** | **Forest** | Mass Failures | **59.28** | **44.24** |
| Sub-dominant | **Shrubs/Sapling** | **Shrubs/Sapling** | Height | **25.0** | **15.0** |
| (Legacy) | Amount | Mean Hieght | Gullies Number | **0** | |
| Failures | **Multiple** | **20.0** | Gullies Length | **0** | |
| Gullies | **None** | | | | |

Stream: **Allen (Petty) Brook** Reach: **T1.06-A**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Abundant** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Abundant** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **17** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **2** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **65** |

4.8 Channel Constrictions: **None**

## Step 5. Channel Bed and Planform Changes

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | **0** | 5.2 Other Features | | Neck Cutoff: | **2** | 5.4 Stream Ford or Animal Crossing: | | **Yes** |
| Mid: | **2** | Delta: | **1** | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **None** |
| Point: | **10** | Island: | **0** | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **0** |
| Side: | **0** | Braiding: | **0** | Steep Riffles: | **0** | Trib Rejuv.: | **No** | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | | |
|---|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | | 6.4 Sediment Deposition: | | Stream Gradiant Type | Left Right |
| 6.2 Pool Substrate: | | 6.5 Channel Flow Status: | | 6.8 Bank Stability: | |
| 6.3 Pool Variability: | | 6.6 Channel Alteration: | | 6.9 Bank Vegetation Protection | |
| Total Score: | **0** | 6.7 Channel Sinuosity: | | 6.10 Riparian Veg. Zone Width: | |
| Habitat Rating: | **0.00** | | | | |
| Habitat Stream Condition: | | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | **Unconfined** | Score | STD | Historic | | |
|---|---|---|---|---|---|---|
| 7.1 Channel Degradation | | **16** | **None** | **No** | Geomorphic Rating | **0.76** |
| 7.2 Channel Aggradation | | **16** | **None** | **No** | Channel Evolution Model | **F** |
| 7.3 Widening Channel | | **15** | **None** | **No** | Channel Evolution Stage | **I** |
| 7.4 Change in Planforml | | **14** | **None** | **No** | Geomorphic Condition | **Good** |
| Total Score | | **61** | | | Stream Sensitivity | **High** |

# Phase 2 Segment Summary Report Malletts Creek



Stream: **Allen (Petty) Brook**
Reach: **T1.06-B**
Segment Length(ft): **1,009**
Rain: **Yes**

SGAT Version: **4.56**
Organization: **Fitzgerald Environmental**
Observers: **EPF, SPP**
Completion Date: **10/19/2010**
Qualtiy Control Status - Consultant: **Provisional**
Qualtiy Control Status - Staff: **Provisional**
Why Not Assessed: **no property access**

Step 0 - Location: **From segment break just upstream of confluence with subtributary T1.06.t1.01 to segment break 110 ft upstream of the Sweeny Farm Rd Crossing**

Step 5 - Notes: **Property access restricted a full RGA assessment on this segment, however banks and buffers were assessed from the road and using GIS. Also, the culvert was assessed at the Sweeny Farm Road crossing because the stream is in the ROW of the road in the public domain.**

Step 7 - Narrative:

## Step 1. Valley and Floodplain

1.1 Segmentation: **Property Access**
1.2 Alluvial Fan: **None**
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 665 | 12 | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 350 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Steep | Steep |
| Continuous w/ Bank: | Sometimes | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features

Valley Width (ft): **170**
Width Determination: **Measured**
Confinement Type: **VB**
In Rock Gorge: **No**
Human Caused Change in Valley Width?: **Yes**

1.6 Grade Controls: **None**

Stream: **Allen (Petty) Brook** Reach: **T1.06-B**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on Bed: | |
| 2.2 Max Depth (ft.): | | 2.12 Substrate Composition | | Bar: | |
| 2.3 Mean Depth (tf): | | Bedrock: | % | 2.14 Stream Type | |
| 2.4 Floodprone Width (ft.): | | Boulder: | % | Stream Type: | **E** |
| 2.5 Aband. Floodpn (ft.): | | Cobble: | % | Bed Material: | **Sand** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | % | Subclass Slope: | **None** |
| 2.6 Width/Depth Ratio: | **0.00** | Fine Gravel: | % | Bed Form: | **Plane Bed** |
| 2.7 Entrenchment Ratio: | **0.00** | Sand: | % | Field Measured Slope: | |
| 2.8 Incision Ratio: | **0.00** | Silt and Smaller: | % | 2.15 Sub-reach Stream Type | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | | Reference Stream Type: | |
| 2.9 Sinuosity: | | Detritus: | **0.0 %** | Reference Bed Material: | |
| 2.10 Riffles Type: | | # Large Woody Debris: | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Steep**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **0.0** | **0.0** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **0.0** | **0.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **1-25** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **0-25** | **0-25** |
| Sub-Dominant | **26-50** | **26-50** |
| W less than 25 | **708** | **852** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Herbaceous** |
| Sub-Dominant | **Mixed Trees** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Hay** | **Residential** |
| Sub-dominant | **Residential** | **Bare** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: **Allen (Petty) Brook** Reach: **T1.06-B**

## Step 4. Flow & Flow Modifiers

| | | | | | |
|---|---|---|---|---|---|
| 4.1 Springs / Seeps: | **Minimal** | 4.5 Flow Regulation Type | **None** | 4.7 Stormwater Inputs | **None** |
| 4.2 Adjacent Wetlands: | **Minimal** | Flow Reg. Use: | | Field Ditch: | Road Ditch: |
| 4.3 Flow Status: | **Moderate** | Impoundments: | **None** | Other: | Tile Drain: |
| 4.4 # of Debris Jams: | **0** | Impoundment Loc.: | | Overland Flow: | Urb Strm Wtr Pipe: |
| | | 4.6 Up/Down Strm flow reg.: | **None** | 4.9 # of Beaver Dams: | **0** |
| | | (old) Upstrm Flow Reg.: | **None** | Affected Length (ft): | **0** |

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **6.5** | **Yes** | **Yes** | **Yes** | **Yes** | **Deposition Above,Scour Below** |

## Step 5. Channel Bed and Planform Changes

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5.1 Bar Types | Diagonal: | 5.2 Other Features | | Neck Cutoff: | **0** | 5.4 Stream Ford or Animal Crossing: | **No** |
| Mid: | Delta: | Flood chutes: | **0** | Avulsion: | **0** | 5.5 Straightening: | **Straightening** |
| Point: | Island: | 5.3 Steep Riffles and Head Cuts | | Head Cuts: | **0** | Straightening Length (ft.): | **195** |
| Side: | Braiding: **0** | Steep Riffles: | **0** | Trib Rejuv.: | | 5.5 Dredging: | **None** |

## Step 6. Rapid Habitat Assessment Data

| | | | | |
|---|---|---|---|---|
| 6.1 Epifaunal Substrate - Avl.: | 6.4 Sediment Deposition: | Stream Gradiant Type | Left | Right |
| 6.2 Pool Substrate: | 6.5 Channel Flow Status: | 6.8 Bank Stability: | | |
| 6.3 Pool Variability: | 6.6 Channel Alteration: | 6.9 Bank Vegetation Protection | | |
| Total Score: | 6.7 Channel Sinuosity: | 6.10 Riparian Veg. Zone Width: | | |
| Habitat Rating: | | | | |
| Habitat Stream Condition: | | | | |

## Step 7. Rapid Geomorphic Assessment Data

| Confinement Type | Score | STD | Historic | | |
|---|---|---|---|---|---|
| 7.1 Channel Degradation | | | | Geomorphic Rating | |
| 7.2 Channel Aggradation | | | | Channel Evolution Model | |
| 7.3 Widening Channel | | | | Channel Evolution Stage | |
| 7.4 Change in Planforml | | | | Geomorphic Condition | **Fair** |
| Total Score | | | | Stream Sensitivity | |

# Phase 2 Segment Summary Report Malletts Creek



Stream: Allen (Petty) Brook
Reach: T1.06-C
Segment Length(ft): 747
Rain: Yes

SGAT Version: 4.56
Organization: Fitzgerald Environmental
Observers: EPF, SPP
Completion Date: 10/19/2010
Qualtiy Control Status - Consultant: Provisional
Qualtiy Control Status - Staff: Provisional

Step 0 - Location: **From segment break upstream of Sweeny Farm Road to the reach break upstream of Allen Brook Drive.**

Step 5 - Notes: **This segment has been heavily manipulated by humans and as a result the geomorphic and habitat conditions have been reduced dramatically. The lack of full-sized trees and dense shrubs in the riparian buffer leave the channel open to thermal loading and the banks free to erode.**

**The Allen Brook Crossing spans the road and floodprone/valley constriction is anthropogenic in nature. The Sweeny Farm Road Crossing (in Segment T1.06-B) also has a considerable amount of fill that span the valley. These sites significantly change the shape and function of the valley so "yes" is checked for human caused change to valley width. Adding a HE-IR would be difficult in this setting because it is difficult to determine natural versus unnatural grades, however some human-elevated floodplain is present.**

Step 7 - Narrative: **Channel straightening and reduced buffer width leading to impacted condition with adjustments to plandform and degradation.**

## Step 1. Valley and Floodplain

1.1 Segmentation: Property Access
1.2 Alluvial Fan: None
1.3 Corridor Encroachments:

| Length (ft) | One | Height | Both | Height |
|---|---|---|---|---|
| Berm: | 0 | | 0 | |
| Road: | 377 | 15 | 0 | |
| Railroad: | 0 | | 0 | |
| Imp. Path: | 0 | | 0 | |
| Dev.: | 0 | | 0 | |

1.4 Adjacent Side

| | Left | Right |
|---|---|---|
| Hillside Slope: | Steep | Very Steep |
| Continuous w/ Bank: | Never | Sometimes |
| Within 1 Bankfull W: | Sometimes | Sometimes |
| Texture: | N.E. | N.E. |

1.5 Valley Features

Valley Width (ft): 153
Width Determination: Measured
Confinement Type: VB
In Rock Gorge: No
Human Caused Change in Valley Width?: Yes

1.6 Grade Controls: None

Stream: **Allen (Petty) Brook** Reach: **T1.06-C**

## Step 2. Stream Channel

| | | | | | |
|---|---|---|---|---|---|
| 2.1Bankfull Width (ft.): | **12.70** | 2.11 Riffle/Step Spacing: | | 2.13 Average Largest Particle on | |
| 2.2 Max Depth (ft.): | **2.60** | 2.12 Substrate Composition | | Bed: | **N/A** |
| 2.3 Mean Depth (tf): | **1.61** | Bedrock: | **0.0 %** | Bar: | **N/A** |
| 2.4 Floodprone Width (ft.): | **155.00** | Boulder: | **0.0 %** | 2.14 Stream Type | |
| 2.5 Aband. Floodpn (ft.): | **3.10** | Cobble: | **0.0 %** | Stream Type: | **E** |
| Human Elev FloodPln (ft.): | | Coarse Gravel: | **5.0 %** | Bed Material: | **Sand** |
| 2.6 Width/Depth Ratio: | **7.89** | Fine Gravel: | **9.0 %** | Subclass Slope: | **None** |
| 2.7 Entrenchment Ratio: | **12.20** | Sand: | **71.0 %** | Bed Form: | **Plane Bed** |
| 2.8 Incision Ratio: | **1.19** | Silt and Smaller: | **15.0 %** | Field Measured Slope: | |
| Human Elevated Inc. Rat.: | **0.00** | Silt/Clay Present: | **Yes** | 2.15 Sub-reach Stream Type | |
| 2.9 Sinuosity: | **Low** | Detritus: | **10.0 %** | Reference Stream Type: | |
| 2.10 Riffles Type: | **Not Applicable** | # Large Woody Debris: | **8** | Reference Bed Material: | |
| | | | | Reference Subclass Slope: | |
| | | | | Reference Bedform: | |

## Step 3. Riparian Features

3.1 Stream Banks — Typical Bank Slope: **Undercut**

| Bank Texture | | | Bank Erosion | Left | Right | Near Bank Vegetation Type | Left | Right |
|---|---|---|---|---|---|---|---|---|
| Upper | Left | Right | Erosion Length (ft.): | **51.4** | **82.3** | Dominant: | **Herbaceous** | **Herbaceous** |
| Material Type: | **Sand** | **Sand** | Erosion Height (ft.): | **3.0** | **3.0** | Sub-dominant: | **Shrubs/Sapling** | **Shrubs/Sapling** |
| Consistency: | **Non-cohesive** | **Non-cohesive** | Revetment Type: | **None** | **None** | Bank Canopy | | |
| Lower | | | Revetment Length: | **0.0** | **0.0** | Canopy %: | **1-25** | **1-25** |
| Material Type: | **Sand** | **Sand** | | | | Mid-Channel Canopy: | **Open** | |
| Consistency: | **Non-cohesive** | **Non-cohesive** | | | | | | |

### 3.2 Riparian Buffer

| Buffer Width | Left | Right |
|---|---|---|
| Dominant | **0-25** | **0-25** |
| Sub-Dominant | **26-50** | **26-50** |
| W less than 25 | **619** | **652** |
| Buffer Vegitation Type | | |
| Dominant | **Herbaceous** | **Herbaceous** |
| Sub-Dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |

### 3.3 Riparian Corridor

| Corridor Land | Left | Right |
|---|---|---|
| Dominant | **Residential** | **Residential** |
| Sub-dominant | **Shrubs/Sapling** | **Shrubs/Sapling** |
| (Legacy) | Amount | Mean Hieght |
| Failures | **None** | |
| Gullies | **None** | |

| | Left | Right |
|---|---|---|
| Mass Failures | | |
| Height | | |
| Gullies Number | **0** | |
| Gullies Length | **0** | |

Stream: **Allen (Petty) Brook** Reach: **T1.06-C**

## Step 4. Flow & Flow Modifiers

4.1 Springs / Seeps: **Minimal**
4.2 Adjacent Wetlands: **Abundant**
4.3 Flow Status: **Moderate**
4.4 # of Debris Jams: **3**

4.5 Flow Regulation Type **None**
Flow Reg. Use:
Impoundments: **None**
Impoundment Loc.:
4.6 Up/Down Strm flow reg.: **None**
(old) Upstrm Flow Reg.: **None**

4.7 Stormwater Inputs
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**

4.8 Channel Constrictions:

| Type | Width | Photo Taken? | GPS Taken? | Channel Constriction? | Floodprone Constriction? | Problems |
|---|---|---|---|---|---|---|
| **Instream Culvert** | **7** | **Yes** | **Yes** | **Yes** | **Yes** | **Scour Below** |

## Step 5. Channel Bed and Planform Changes

5.1 Bar Types
Diagonal: **0**
Mid: **0**
Delta: **0**
Point: **1**
Island: **0**
Side: **0**
Braiding: **0**

5.2 Other Features
Neck Cutoff: **0**
Flood chutes: **0**
Avulsion: **0**

5.3 Steep Riffles and Head Cuts
Head Cuts: **0**
Steep Riffles: **0**
Trib Rejuv.: **No**

5.4 Stream Ford or Animal Crossing: **No**
5.5 Straightening: **Straightening**
Straightening Length (ft.): **399**
5.5 Dredging: **None**

## Step 6. Rapid Habitat Assessment Data

6.1 Epifaunal Substrate - Avl.:
6.2 Pool Substrate:
6.3 Pool Variability:
Total Score: **0**
Habitat Rating: **0.00**
Habitat Stream Condition:

6.4 Sediment Deposition:
6.5 Channel Flow Status:
6.6 Channel Alteration:
6.7 Channel Sinuosity:

Stream Gradiant Type Left Right
6.8 Bank Stability:
6.9 Bank Vegetation Protection
6.10 Riparian Veg. Zone Width:

## Step 7. Rapid Geomorphic Assessment Data

Confinement Type **Unconfined**

| | Score | STD | Historic |
|---|---|---|---|
| 7.1 Channel Degradation | **10** | **None** | **Yes** |
| 7.2 Channel Aggradation | **14** | **None** | **No** |
| 7.3 Widening Channel | **15** | **None** | **No** |
| 7.4 Change in Planforml | **12** | **None** | **No** |
| Total Score | **51** | | |

Geomorphic Rating **0.64**
Channel Evolution Model **F**
Channel Evolution Stage **II**
Geomorphic Condition **Fair**
Stream Sensitivity **Extreme**

# STRUCTURE SUMMARY DATA

VERMONT

# Stream Geomorphic Assessment

**Agency of Natural Resouces**

VT DEC

Vermont.gov

February, 21 2011

## Culvert Summary Report

## Mallets Creek

### General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 700000000004103 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/28/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.6343 | Longitude | -73.08852 |
| Location | Forest Road Crossing (Private) | | | Reach VTID | M17 |
| Road Name | FOREST RD (PVT) | Road Type | Gravel | Stream Name | Malletts Creek Main Stem |

| | | | |
|---|---|---|---|
| High Flow Stage | No | Channel Width | 19.86 |

### Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 27 | Material | Steel Corrugated |
| Culvert Height | 9 | Number of culverts | 1 |
| Culvert Width | 9.5 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

### Geomorphic Information

#### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | Yes |
| | | Culvert slope as compared with channel slope is significantly | Same |

#### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Sharp Bend |
| If channel avulses, stream will | Cross Road | | |

#### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 0.8 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | At Grade |
| Stepped Footers | | Backwater Length (measured from outlet) | |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Gravel | Cobble | None |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | Point | None | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | Low | None | |
| Hard Bank Armoring | Intact | Intact | |
| Stream bed scour causing undermining around or under structure | Culvert | Culvert | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

### Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Shrub/Sapling | Mixed Forest | |
| Dominant Vegetation Type - Right | Shrub/Sapling | Deciduous Forest | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | Yes | Yes | |
| Vegitation Band -Right | No | Yes | |

### Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

### Other Information

| | | | |
|---|---|---|---|
| Spatial location data collected with GPS? | Yes | Photos taken? | Yes |

Comments **Structure has a rusted out bottom on the downstream end (left side); Old culvert remains at the crossing site perhaps the structure blew out historically.**

# Bridge Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 200007000004052 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 1/1/0001 | Project Name | Malletts Creek |
| Town | Colchester | Latitude | 44.57506 | Longitude | -73.15832 |
| Location | Route 7 crossing near auto dealership | | | Reach VTID | T1.02 |
| Road Name | ROUTE 7 | Road Type | Paved | Stream Name | Allen (Petty) Brook |
| High Flow Stage | No | | | Channel Width | 25.11 |

## Bridge Information

| | | | |
|---|---|---|---|
| Bridge Width | 36 | Material | Concrete |
| Bridge Clearance | 6 | Number of bridge piers/arches | |
| Bridge/Arch Span | 11.5 | | |
| | | Skewed to roadway? | No |

## Geomorphic Information

### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Partially | Structure is located at significant break in valley slope | No |

### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | Yes | Angle of stream flow approaching structure | Channelized Straight |
| If channel avulses, stream will | Cross Road | | |

### Downstream

| | |
|---|---|
| Pool present immediately downstream of structure | No |
| Downstream bank heights are substantially higher than upstream bank heights | No |
| Pool Depth at point of streamflow entry | No |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Sand | Gravel | Sand |
| Bedrock Present | No | No | No |
| Type of Sediment Deposits | None | None | None |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | None | Low | |
| Hard Bank Armoring | None | None | |
| Stream bed scour causing undermining around or under structure | None | None | |
| Beaver Dam near Structure | Yes | No | |
| Beaver Dam distance (ft.) | 150 | | |

## Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | |
|---|---|---|
| Vegitation Band - Left | Yes | Yes |
| Vegitation Band -Right | No | Yes |

## Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

## Other Information

Spatial location data collected with GPS? **Yes** Photos taken? **Yes**

Comments **Structure is in good shape, however a steep riffle of coarse gravel has formed upstream of the structure and their is a 3.5' deep pool within the structure.**

# Culvert Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 990000000004103 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/28/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.63698 | Longitude | -73.10239 |
| Location | Farm Road crossing 660 feet downstream of Main Street Channel Crossing | | | Reach VTID | T6.01 |
| Road Name | | Road Type | Trail | Stream Name | Unnamed Tributary to Malletts Creek |
| High Flow Stage | No | | | Channel Width | 10.78 |

## Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 20 | Material | Tank |
| Culvert Height | 5 | Number of culverts | 1 |
| Culvert Width | 5 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

## Geomorphic Information

### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Same |

### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | Deformation | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Channelized Straight |
| If channel avulses, stream will | Cross Road | | |

### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 1 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | Partially Backwatered |
| Stepped Footers | | Backwater Length (measured from outlet) | 10 |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Sand | Gravel | None |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | None | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | Low | Low | |
| Hard Bank Armoring | None | None | |
| Stream bed scour causing undermining around or under structure | Culvert | Culvert | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

## Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | No | No | |
| Vegitation Band -Right | No | Yes | |

## Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

## Other Information

Spatial location data collected with GPS? **Yes** Photos taken? **Yes**

Comments **Culvert is an old tank which is undersized. The lip of the tank is causing some backwatering and erosion of the road is present.**

# Culvert Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100005000004101 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/13/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.63212 | Longitude | -73.10121 |
| Location | East Road crossing about 2,500 feet south of intersection with Westford Road. | | | Reach VTID | M17 |
| Road Name | EAST RD | Road Type | Paved | Stream Name | Malletts Creek Main Stem |
| High Flow Stage | No | | | Channel Width | 19.86 |

## Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 30 | Material | Concrete |
| Culvert Height | 5 | Number of culverts | 1 |
| Culvert Width | 11 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

VERMONT

# Stream Geomorphic Assessment

## Agency of Natural Resouces

VT DEC

Vermont.gov

Februarv. 21 2011

### Geomorphic Information

#### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Same |

#### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Mild Bend |
| If channel avulses, stream will | Cross Road | | |

#### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | Yes | Water depth in culvert (at outlet) | 0.05 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | At Grade |
| Stepped Footers | 0.2 ft. | Backwater Length (measured from outlet) | |
| Maximum pool depth | 1.5 ft. | Backwater Length (measured from outlet) | 0.1 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Cobble | Gravel | None |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | Side | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | Low | Low | |
| Hard Bank Armoring | Intact | Intact | |
| Stream bed scour causing undermining around or under structure | None | None | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

### Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Shrub/Sapling | Deciduous Forest | |
| Dominant Vegetation Type - Right | Shrub/Sapling | Deciduous Forest | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | No | Yes | |
| Vegitation Band -Right | No | No | |

### Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

### Other Information

Spatial location data collected with GPS? **Yes** Photos taken? **Yes**

Comments **Structure is recent and has no major problems.**

# Culvert Summary Report

# Mallets Creek

### General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100002000004101 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/28/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.63872 | Longitude | -73.10106 |
| Location | Tributary crossing of Main Street before it becomes Westford Road. | | | Reach VTID | T6.01 |
| Road Name | MAIN ST | Road Type | Paved | Stream Name | Unnamed Tributary to Malletts Creek |
| High Flow Stage | No | | | Channel Width | 10.78 |

### Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 60 | Material | Concrete |
| Culvert Height | 4 | Number of culverts | 1 |

| | | | |
|---|---|---|---|
| Culvert Width | 8 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

## Geomorphic Information

### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Same |

### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Channelized Straight |
| If channel avulses, stream will | Cross Road | | |

### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 0.1 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | Cascade |
| Stepped Footers | | Backwater Length (measured from outlet) | |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0.2 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Gravel | Gravel | None |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | None | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | None | None | |
| Hard Bank Armoring | None | None | |
| Stream bed scour causing undermining around or under structure | None | None | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

## Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | No | No | |
| Vegitation Band -Right | No | No | |

## Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

## Other Information

| | | | |
|---|---|---|---|
| Spatial location data collected with GPS? | Yes | Photos taken? | Yes |

Comments **A small headcut is located upstream of the structure where willow roots are stabilizing its progression upslope. Limited buffer up and downstream of the structure.**

# Culvert Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100035000004101 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/13/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.62343 | Longitude | -73.10483 |
| Location | Kingsbury Road Crossing of segment M15-B | | | Reach VTID | M15 |
| Road Name | KINGSBURY RD | Road Type | Gravel | Stream Name | Malletts Creek Main Stem |
| High Flow Stage | No | | | Channel Width | 24.13 |

## Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 30 | Material | Concrete |
| Culvert Height | 4 | Number of culverts | 1 |
| Culvert Width | 14 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

## Geomorphic Information

### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Same |

### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | 75 |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Mild Bend |
| If channel avulses, stream will | Follow Road | | |

### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 0.3 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | At Grade |
| Stepped Footers | | Backwater Length (measured from outlet) | |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Gravel | Gravel | Sand |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | None | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | No |
| Bank Erosion | None | Low | |
| Hard Bank Armoring | Failing | Failing | |
| Stream bed scour causing undermining around or under structure | None | None | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

## Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | No | No | |
| Vegitation Band -Right | Yes | Yes | |

## Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

## Other Information

Spatial location data collected with GPS? **Yes**

Photos taken? **Yes**

Comments **Structure appears to be new; old structure must have blown out, because of abundance of unnatural angular coarse gravel downstream.**

# Culvert Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100010000004051 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/12/2010 | Project Name | Malletts Creek |
| Town | Colchester | Latitude | 44.57854 | Longitude | -73.15721 |
| Location | Coon Hill Road Crossing of reach T1.03 | | | Reach VTID | T1.03 |
| Road Name | COON HILL RD | Road Type | Gravel | Stream Name | Allen (Petty) Brook |
| High Flow Stage | No | | | Channel Width | 23.46 |

## Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 60 | Material | Steel Corrugated |
| Culvert Height | 5 | Number of culverts | 1 |
| Culvert Width | 5 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

## Geomorphic Information

### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Lower |

### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | Wood debris | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Mild Bend |
| If channel avulses, stream will | Unsure | | |

### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | Yes | Water depth in culvert (at outlet) | 1.6 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | Entirely Backwatered |
| Stepped Footers | 1.6 ft. | Backwater Length (measured from outlet) | 60 |
| Maximum pool depth | 3.7 ft. | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Sand | Gravel | Sand |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | Point,Side | Side | None |
| Material Present throughout | | | No |
| Elevation of sediment deposits >= 1/2 bankfull | Yes | Yes | No |
| Bank Erosion | High | High | |
| Hard Bank Armoring | None | Failing | |
| Stream bed scour causing undermining around or under structure | Culvert | None | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

## Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Shrub/Sapling | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Shrub/Sapling | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | Yes | Yes | |
| Vegitation Band -Right | Yes | No | |

## Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

## Other Information

Spatial location data collected with GPS? Yes

Photos taken? Yes

Comments **Culvert is undersized considerably and is at a much lower grade than the channel. Because of the small size a lot of scour downstream and aggradation and scour upstream has occurred. The upstream end is blocked by LWD and deformed on the DS end. US and DS a lot of scour around the culvert is evident.**

# Culvert Summary Report

# Mallets Creek

## General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100021000004101 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/19/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.60239 | Longitude | -73.16057 |
| Location | Sweeny Farm Road Crossing | | | Reach VTID | T1.06 |

VERMONT

# Stream Geomorphic Assessment

VT DEC

## Agency of Natural Resouces

Vermont.gov

February, 21 2011

| | | | | | |
|---|---|---|---|---|---|
| Road Name | SWEENY FARM RD | Road Type | Paved | Stream Name | Allen (Petty) Brook |
| High Flow Stage | No | | | Channel Width | 19.83 |

### Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 50 | Material | Tank |
| Culvert Height | 3.6 | Number of culverts | 1 |
| Culvert Width | 6.5 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | No |

### Geomorphic Information

General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Lower |

Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | Yes | Angle of stream flow approaching structure | Channelized Straight |
| If channel avulses, stream will | Unsure | | |

Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 0.8 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | At Grade |
| Stepped Footers | | Backwater Length (measured from outlet) | |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Sand | Sand | Sand |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | Side | Side,Mid-channel |
| Material Present throughout | | | Yes |
| Elevation of sediment deposits >= 1/2 bankfull | No | No | Yes |
| Bank Erosion | Low | Low | |
| Hard Bank Armoring | Intact | Failing | |
| Stream bed scour causing undermining around or under structure | None | Culvert | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

### Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Shrub/Sapling | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Shrub/Sapling | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | | |
|---|---|---|---|
| Vegitation Band - Left | No | No | |
| Vegitation Band -Right | No | No | |

### Wildlife

| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

### Other Information

| | | | |
|---|---|---|---|
| Spatial location data collected with GPS? | Yes | Photos taken? | Yes |

Comments **Structure is a cut tank that was likely 6.5' round originally, no it is nearly half filled with sediment. It is a 3.6' half cylinder. Some failing rip-rap and old bridge abutments upstream are aggrading sediment.**

# Culvert Summary Report

# Mallets Creek

### General Information

| | | | | | |
|---|---|---|---|---|---|
| SgaID | 100172000004101 | Local SgaID | | VOBCIT struct_num | |
| Observers | EPF (FEA), SPP (FEA) | Assessment Date | 10/19/2010 | Project Name | Malletts Creek |
| Town | Milton | Latitude | 44.60286 | Longitude | -73.15954 |

VERMONT

# Stream Geomorphic Assessment

VT DEC

## Agency of Natural Resouces

Vermont.gov

February, 21 2011

| | | | | | |
|---|---|---|---|---|---|
| Location | Allen Brook Drive Crossing | | | Reach VTID | T1.06 |
| Road Name | | Road Type | Paved | Stream Name | Allen (Petty) Brook |
| High Flow Stage | No | | | Channel Width | 19.83 |

### Culvert Information

| | | | |
|---|---|---|---|
| Culvert Length | 160 | Material | Steel Corrugated |
| Culvert Height | 6 | Number of culverts | 1 |
| Culvert Width | 7 | Culvert Overflow Pipe | No |
| | | Skewed to roadway? | Yes |

### Geomorphic Information

#### General

| | | | |
|---|---|---|---|
| Floodplain filled by roadway approaches | Entirely | Structure is located at significant break in valley slope | No |
| | | Culvert slope as compared with channel slope is significantly | Same |

#### Upstream

| | | | |
|---|---|---|---|
| Obstructions at the opening of the structure | None | Estimated distance avulsion would follow road | |
| Steep riffle present immediately upstream of structure | No | Angle of stream flow approaching structure | Channelized Straight |
| If channel avulses, stream will | Unsure | | |

#### Downstream

| | | | |
|---|---|---|---|
| Pool present immediately downstream of structure | No | Water depth in culvert (at outlet) | 0.4 |
| Downstream bank heights are substantially higher than upstream bank heights | No | Culvert outlet invert | At Grade |
| Stepped Footers | | Backwater Length (measured from outlet) | |
| Maximum pool depth | | Backwater Length (measured from outlet) | 0 |

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Bed Material | Gravel | Sand | Sand |
| Bedrock Present | No | No | |
| Type of Sediment Deposits | None | Mid-channel | None |
| Material Present throughout | | | Yes |
| Elevation of sediment deposits >= 1/2 bankfull | No | Yes | No |
| Bank Erosion | Low | Low | |
| Hard Bank Armoring | None | None | |
| Stream bed scour causing undermining around or under structure | None | None | |
| Beaver Dam near Structure | No | No | |
| Beaver Dam distance (ft.) | | | |

### Vegetation

| | Upstream | Downstream | In Structure |
|---|---|---|---|
| Dominant Vegetation Type - Left | Herbaceous/Grass | Herbaceous/Grass | |
| Dominant Vegetation Type - Right | Herbaceous/Grass | Herbaceous/Grass | |

Does a band of shrub/forest vegetation 50 ft. wide start within 25 ft. of the structure and extend at least 500 ft. up/downstream?

| | | |
|---|---|---|
| Vegitation Band - Left | No | No |
| Vegitation Band -Right | No | No |

### Wildlife

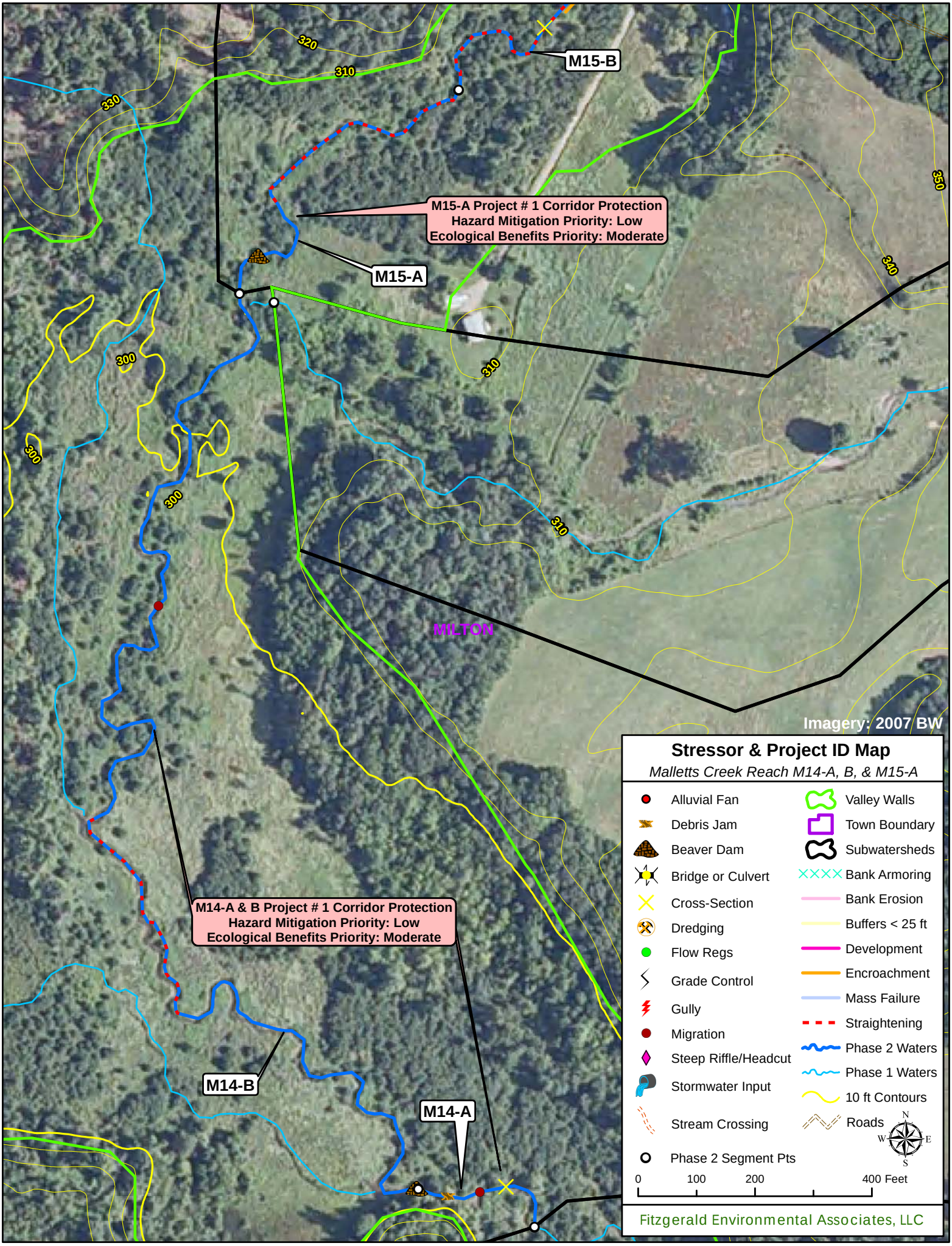
| | Roadkill | Outside Structure | Inside Structure |
|---|---|---|---|
| Species | None | None | None |

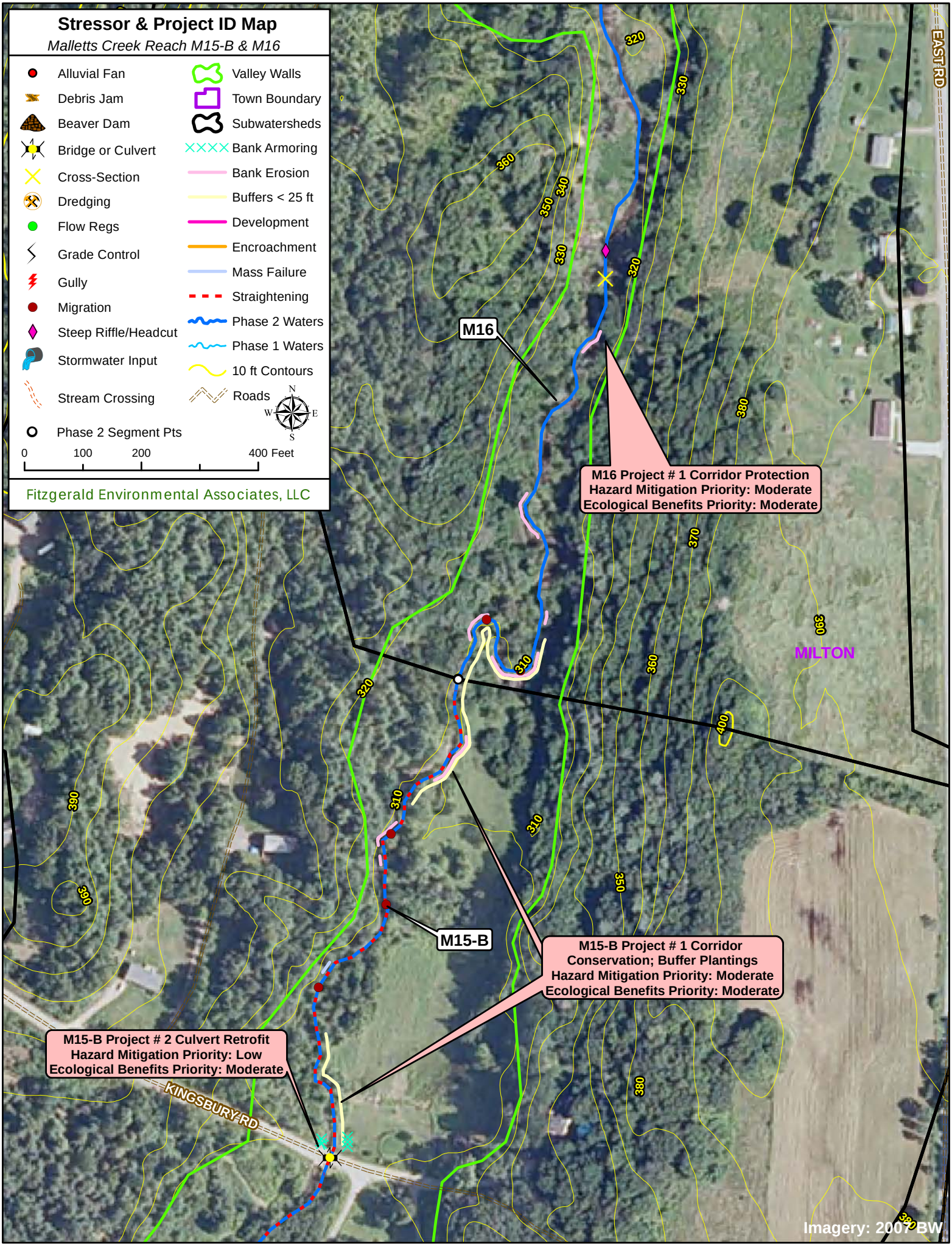
### Other Information

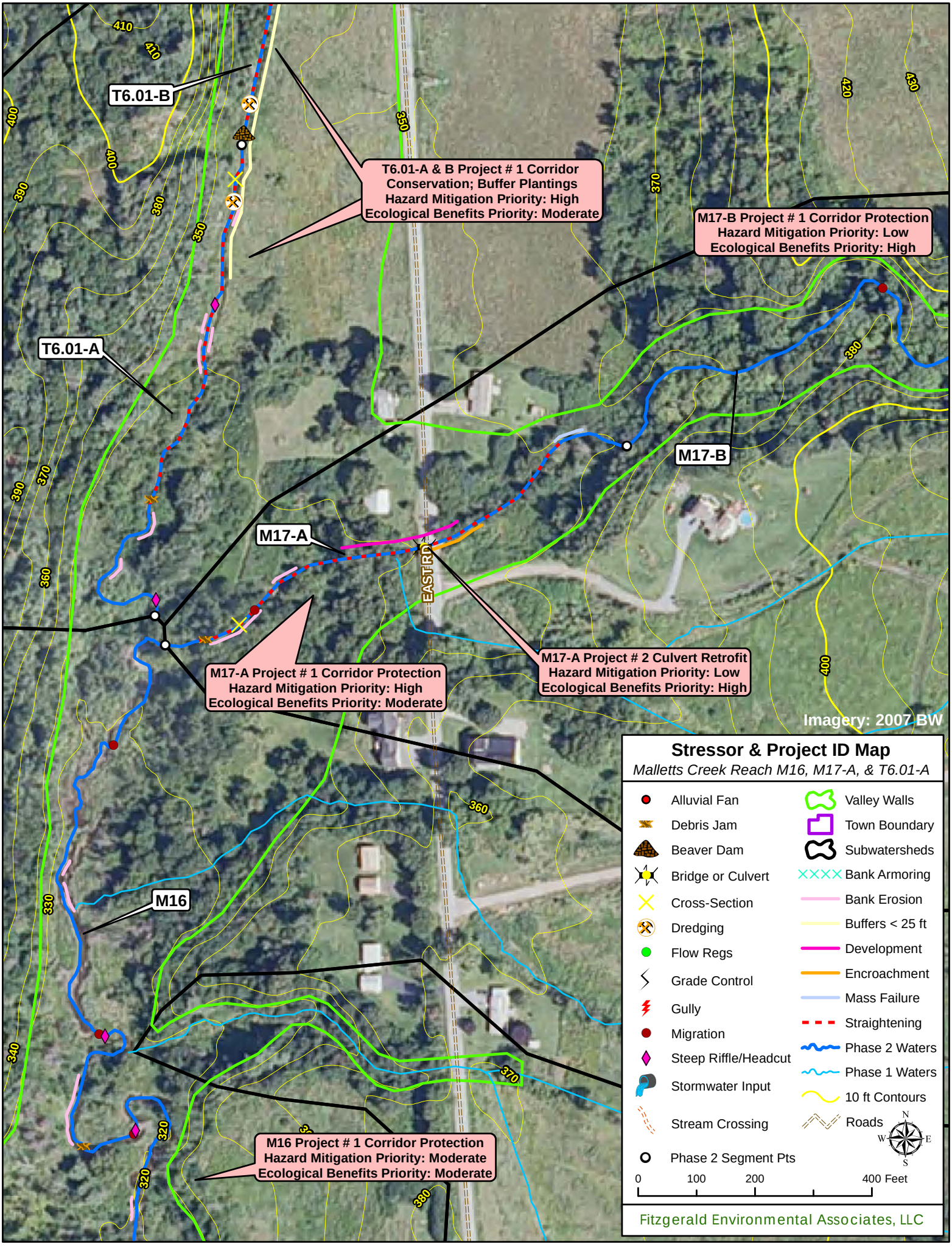
| | | | |
|---|---|---|---|
| Spatial location data collected with GPS? | Yes | Photos taken? | Yes |

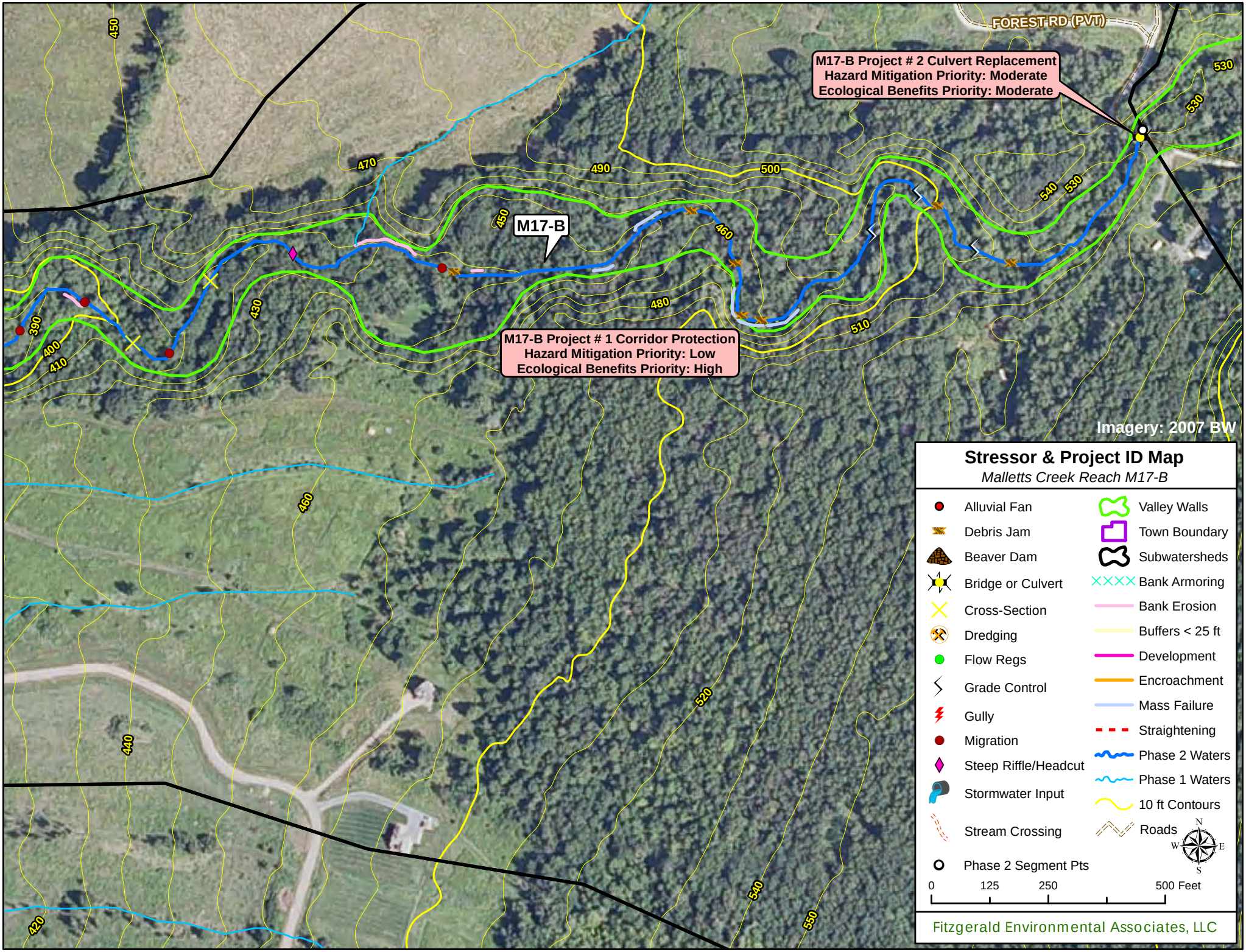
Comments **Structure placed under a very large amount of fill that occupies the entire valley. Several stormwater inputs were noted on the upstream end of the structure.**

# APPENDIX C
## STRESSOR AND PROJECT IDENTIFICATION MAPS


M15-B
M15-A Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Moderate
M15-A
M14-A & B Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Moderate
M14-B
M14-A
MILTON
320
310
330
350
340
300
Imagery: 2007 BW
Stressor & Project ID Map
Malletts Creek Reach M14-A, B, & M15-A
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC


Stressor & Project ID Map
Malletts Creek Reach M15-B & M16
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC
M16
M16 Project # 1 Corridor Protection
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
M15-B
M15-B Project # 1 Corridor
Conservation; Buffer Plantings
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
M15-B Project # 2 Culvert Retrofit
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Moderate
EAST RD
KINGSBURY RD
MILTON
320
330
360
340
350
330
320
380
370
390
360
400
310
320
310
310
350
390
390
380
380
Imagery: 2007 BW


T6.01-B
T6.01-A
T6.01-A & B Project # 1 Corridor
Conservation; Buffer Plantings
Hazard Mitigation Priority: High
Ecological Benefits Priority: Moderate
M17-B Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
M17-B
M17-A
EAST RD
M17-A Project # 1 Corridor Protection
Hazard Mitigation Priority: High
Ecological Benefits Priority: Moderate
M17-A Project # 2 Culvert Retrofit
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
M16
M16 Project # 1 Corridor Protection
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
Imagery: 2007 BW
Stressor & Project ID Map
Malletts Creek Reach M16, M17-A, & T6.01-A
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC


FOREST RD (PVT)
M17-B Project # 2 Culvert Replacement
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
M17-B
M17-B Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
Imagery: 2007 BW
Stressor & Project ID Map
Malletts Creek Reach M17-B
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
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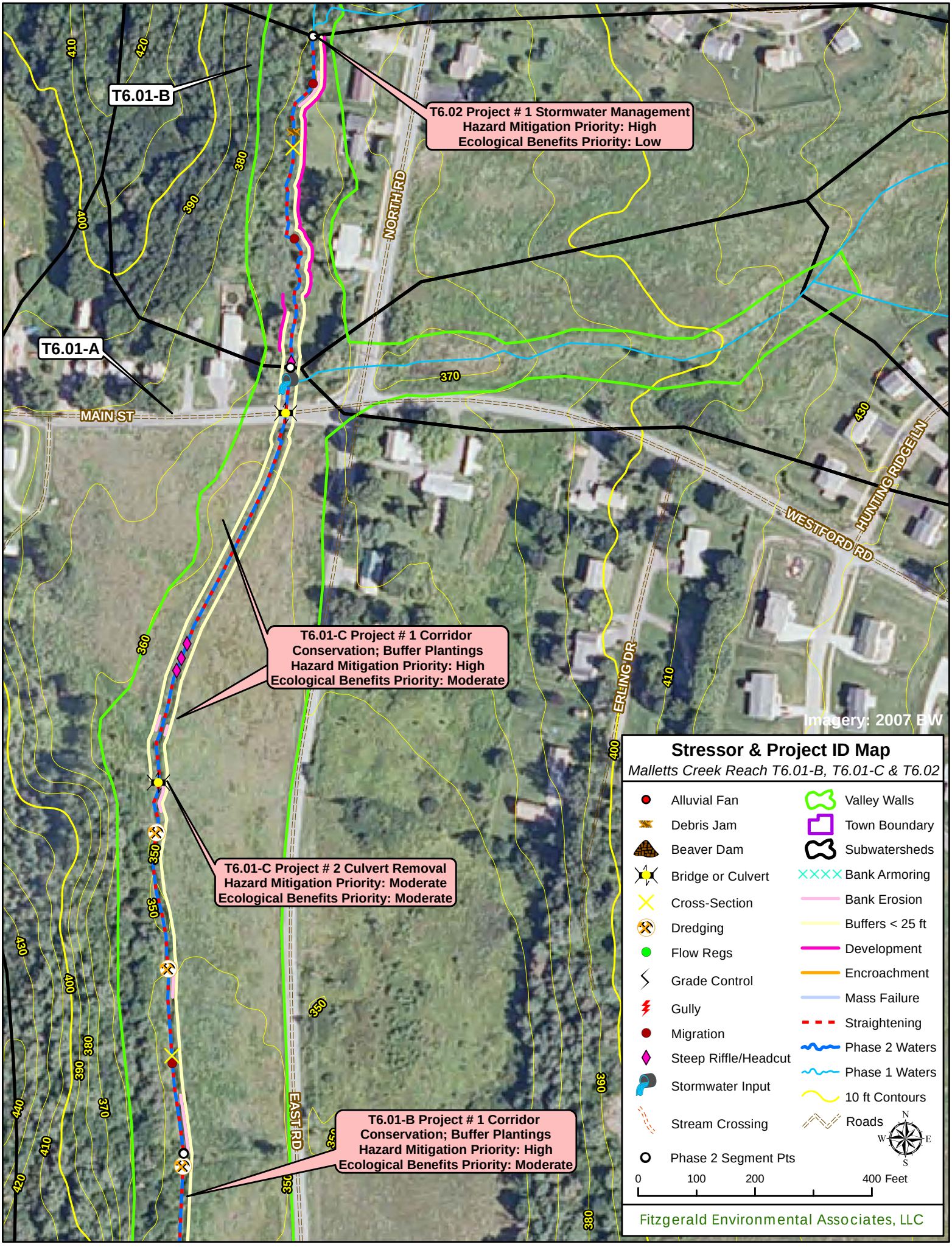
S
0
125
250
500 Feet
Fitzgerald Environmental Associates, LLC


T6.01-B
T6.02 Project # 1 Stormwater Management
Hazard Mitigation Priority: High
Ecological Benefits Priority: Low
T6.01-A
T6.01-C Project # 1 Corridor
Conservation; Buffer Plantings
Hazard Mitigation Priority: High
Ecological Benefits Priority: Moderate
T6.01-C Project # 2 Culvert Removal
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
T6.01-B Project # 1 Corridor
Conservation; Buffer Plantings
Hazard Mitigation Priority: High
Ecological Benefits Priority: Moderate
NORTH RD
MAIN ST
WESTFORD RD
HUNTING RIDGE LN
ERLING DR
EAST RD
Imagery: 2007 BW
Stressor & Project ID Map
Malletts Creek Reach T6.01-B, T6.01-C & T6.02
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
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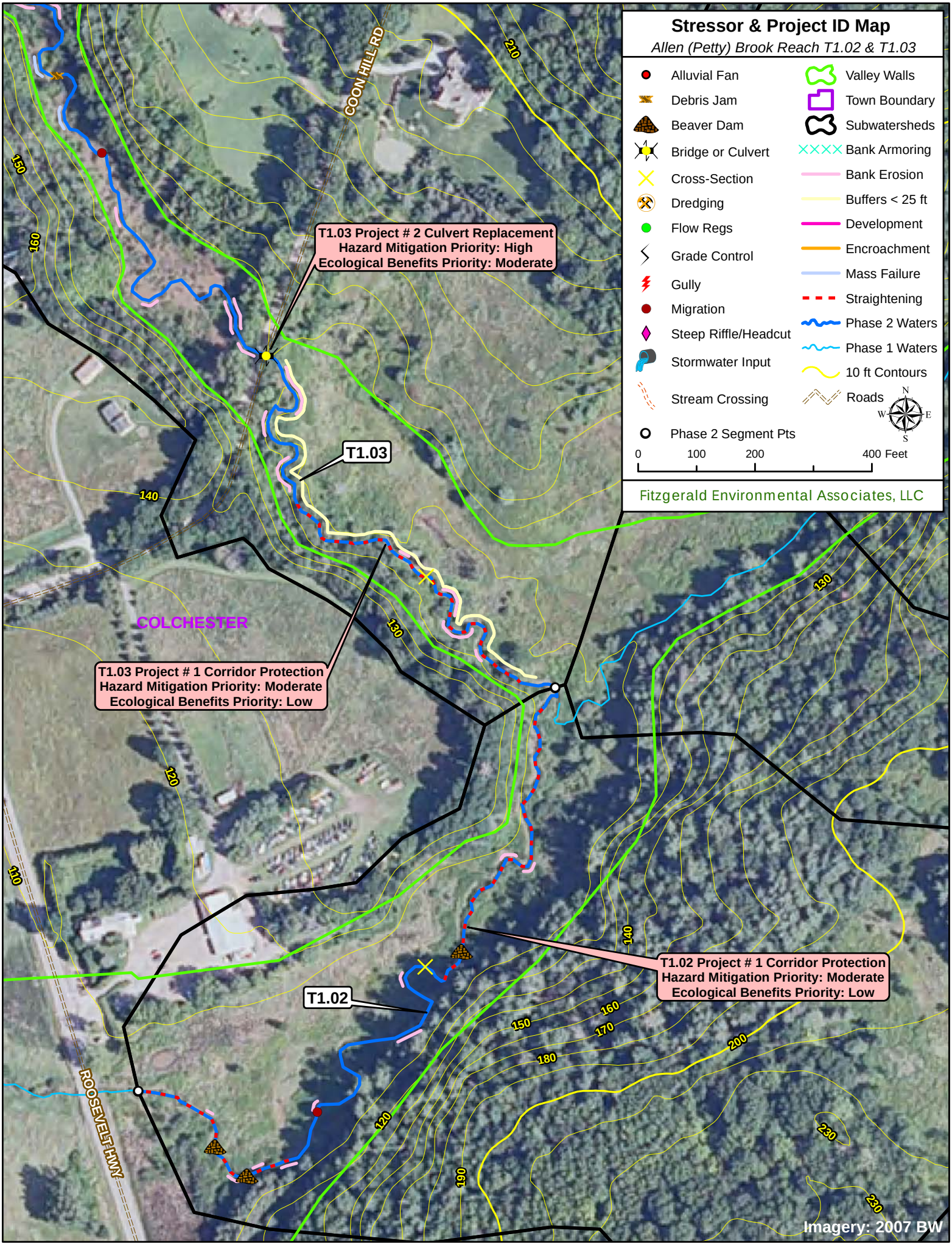
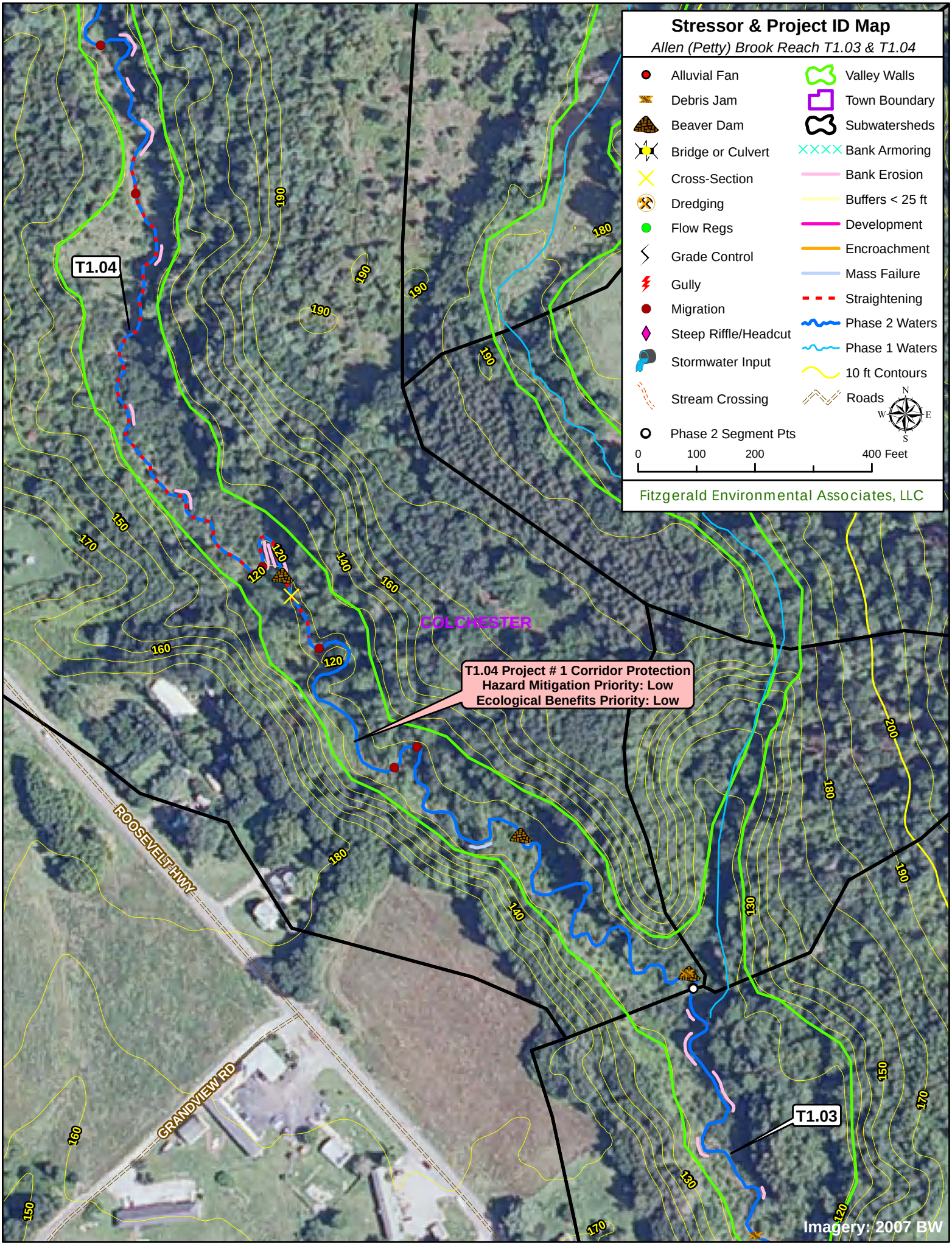
100
200
400 Feet
Fitzgerald Environmental Associates, LLC


Stressor & Project ID Map
Allen (Petty) Brook Reach T1.02 & T1.03
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC
T1.03 Project # 2 Culvert Replacement
Hazard Mitigation Priority: High
Ecological Benefits Priority: Moderate
T1.03
T1.03 Project # 1 Corridor Protection
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Low
T1.02
T1.02 Project # 1 Corridor Protection
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Low
COON HILL RD
ROOSEVELT HWY
COLCHESTER
210
150
160
140
130
120
110
170
180
200
190
230
Imagery: 2007 BW


Stressor & Project ID Map
Allen (Petty) Brook Reach T1.03 & T1.04
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
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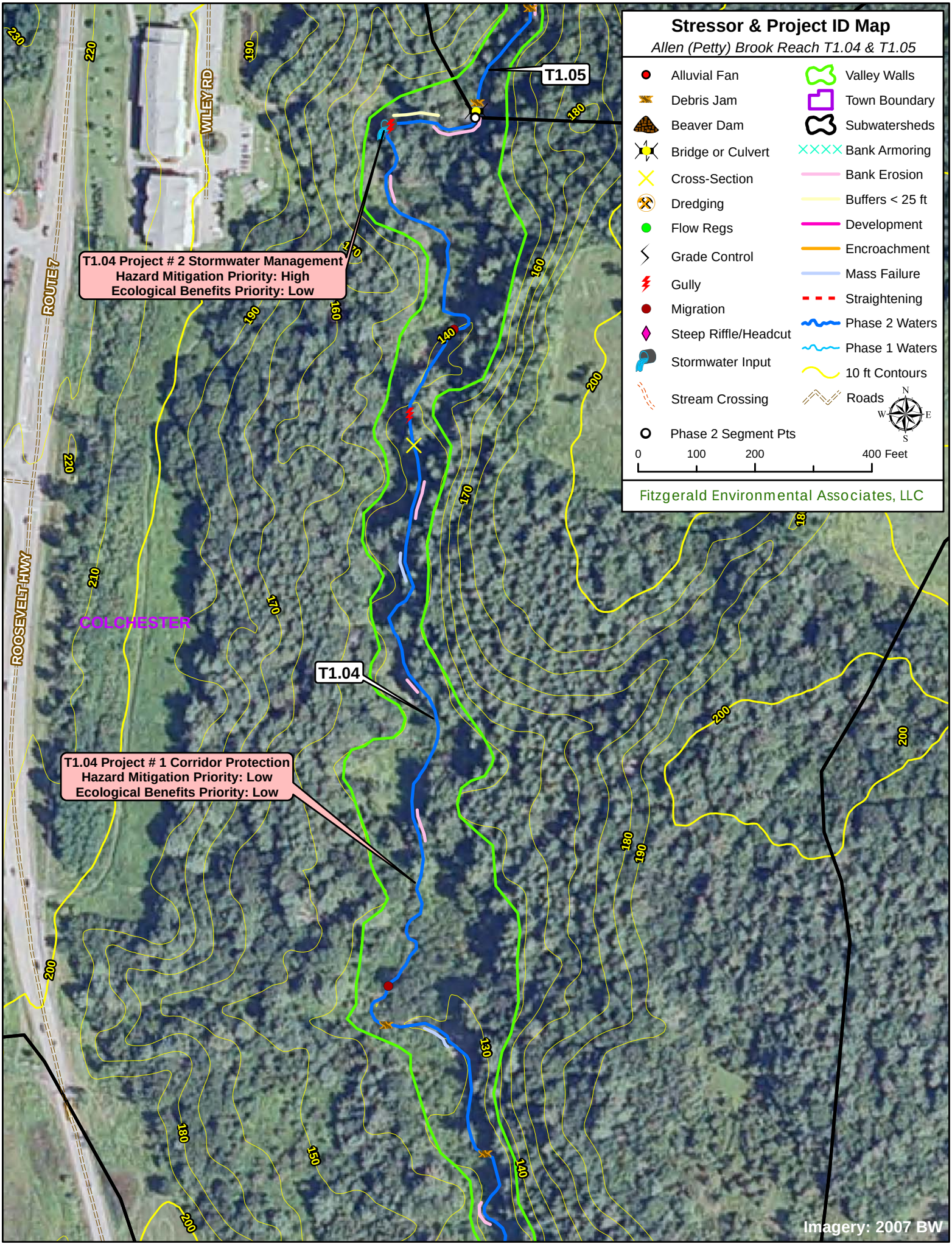
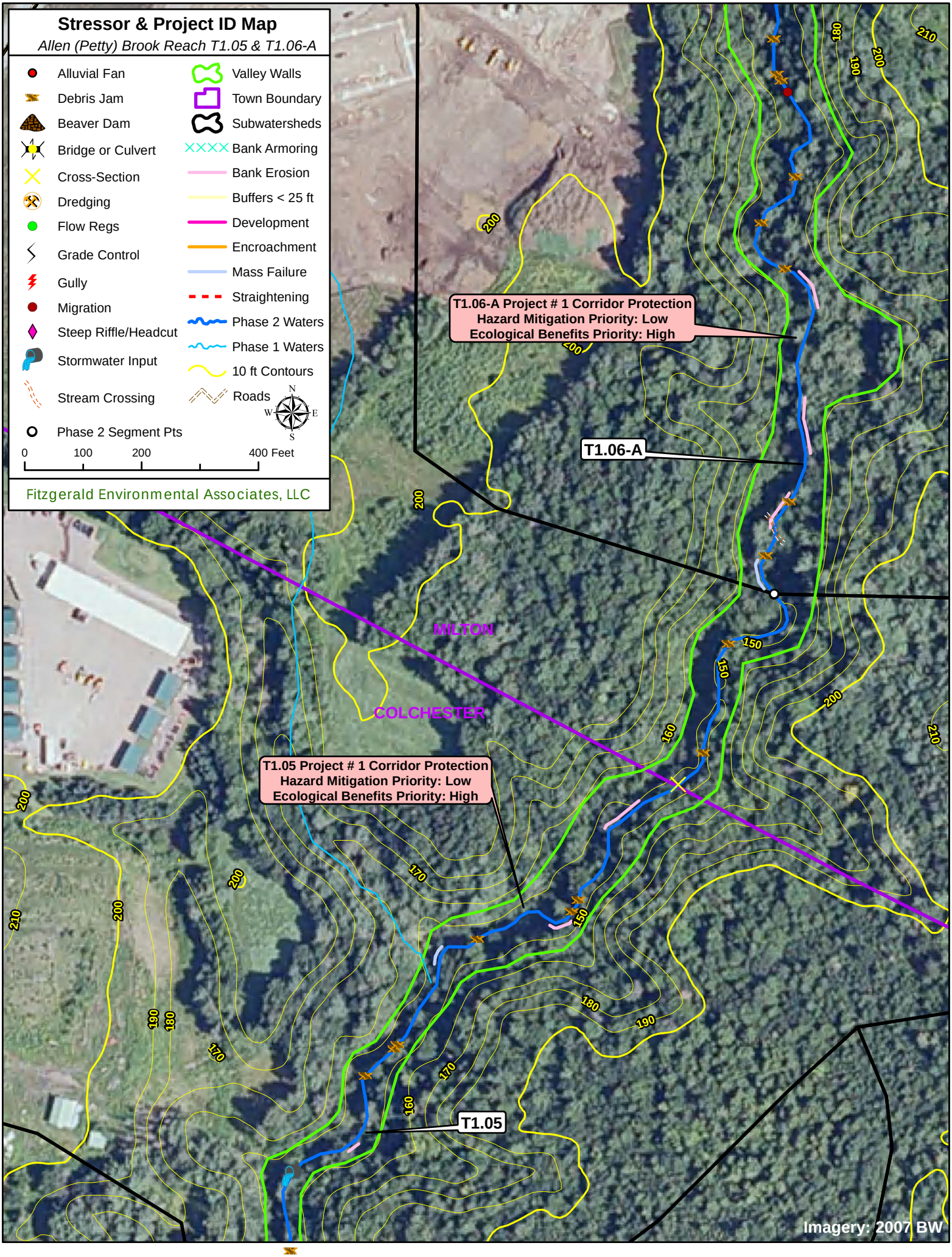
100
200
400 Feet
Fitzgerald Environmental Associates, LLC
T1.04
T1.04 Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Low
COLCHESTER
ROOSEVELT HWY
GRANDVIEW RD
T1.03
Imagery: 2007 BW


Stressor & Project ID Map
Allen (Petty) Brook Reach T1.04 & T1.05
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC
T1.05
T1.04
T1.04 Project # 2 Stormwater Management
Hazard Mitigation Priority: High
Ecological Benefits Priority: Low
T1.04 Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Low
WILEY RD
ROUTE 7
ROOSEVELT HWY
COLCHESTER
Imagery: 2007 BW


Stressor & Project ID Map
Allen (Petty) Brook Reach T1.05 & T1.06-A
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
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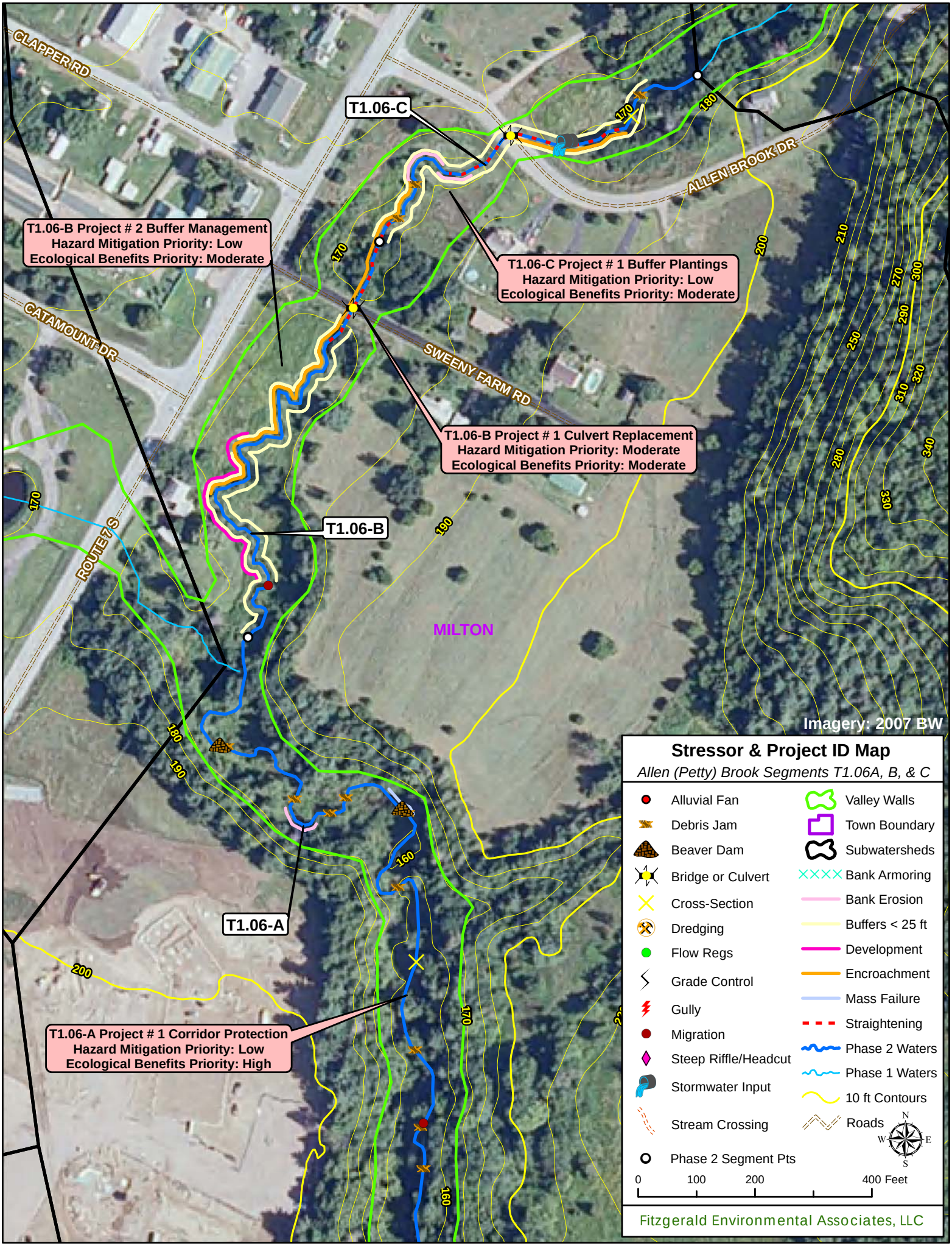
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC
T1.06-A Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
T1.06-A
MILTON
COLCHESTER
T1.05 Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
T1.05
Imagery: 2007 BW


CLAPPER RD
T1.06-C
ALLEN BROOK DR
T1.06-B Project # 2 Buffer Management
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Moderate
T1.06-C Project # 1 Buffer Plantings
Hazard Mitigation Priority: Low
Ecological Benefits Priority: Moderate
CATAMOUNT DR
SWEENY FARM RD
T1.06-B Project # 1 Culvert Replacement
Hazard Mitigation Priority: Moderate
Ecological Benefits Priority: Moderate
ROUTE 7 S
T1.06-B
MILTON
T1.06-A
T1.06-A Project # 1 Corridor Protection
Hazard Mitigation Priority: Low
Ecological Benefits Priority: High
170
180
190
200
210
270
300
290
250
310
320
280
340
330
160
Imagery: 2007 BW
Stressor & Project ID Map
Allen (Petty) Brook Segments T1.06A, B, & C
Alluvial Fan
Debris Jam
Beaver Dam
Bridge or Culvert
Cross-Section
Dredging
Flow Regs
Grade Control
Gully
Migration
Steep Riffle/Headcut
Stormwater Input
Stream Crossing
Phase 2 Segment Pts
Valley Walls
Town Boundary
Subwatersheds
Bank Armoring
Bank Erosion
Buffers < 25 ft
Development
Encroachment
Mass Failure
Straightening
Phase 2 Waters
Phase 1 Waters
10 ft Contours
Roads
N
W
E
S
0
100
200
400 Feet
Fitzgerald Environmental Associates, LLC