

Watershed Field Assessment Report North Branch Park River Watershed

Connecticut Department of
Environmental Protection

March 2010



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Disciplines to Deliver

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In Cooperation With:

**New England Environmental, Inc.
Farmington River Watershed Association
Park River Watershed Revitalization Initiative**

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1 Introduction

The Connecticut Department of Environmental Protection (CTDEP) retained a project team led by Fuss & O'Neill, Inc. and including the Farmington River Watershed Association, the Park River Watershed Revitalization Initiative, and New England Environmental, Inc. to prepare a Watershed Management Plan for the North Branch of the Park River in Hartford County, Connecticut. The Watershed Management Plan is being developed in cooperation with the CTDEP, other governmental entities, stakeholder groups, and the general public. The Plan will identify action items to protect and improve the health of the North Branch Park River watershed.

Three separate watershed assessments were performed to guide the development of a watershed management plan for the North Branch Park River: 1) a Baseline Watershed Assessment, 2) a Watershed Field Assessment, and 3) a Land Use Regulatory Review. The Baseline Watershed Assessment evaluates the existing environmental and land use conditions in the watershed, while the Land Use Regulatory Review identifies potential land use regulatory mechanisms that can be implemented to better protect natural resources within the watershed. This document, the Watershed Field Assessment Report, describes stream corridor and upland assessments conducted by the project team to identify targeted and site-specific opportunities for watershed protection and restoration. This report is a companion document to the Baseline Watershed Assessment and Land Use Regulatory Review reports.

2 Watershed Field Inventories

Field inventories were performed by the Fuss & O'Neill project team during fall 2009 to further assess existing watershed conditions and potential sources of pollution. The field inventories are a screening level tool for locating potential pollutant sources and environmental problems in a watershed along with possible locations where restoration opportunities and mitigation measures can be implemented.

The field inventories included selected stream corridors and upland areas within priority subwatersheds, which were identified in the Baseline Watershed Assessment report based on a comparative subwatershed analysis that considered vulnerability to future development impacts and restoration potential to improve upon existing conditions. Field inventories were performed within the following priority subwatersheds (*Figure 2-1*):

- Filley Brook,
- Wash Brook North and South,
- Beaman Brook East and West,
- Tumbledown Brook,
- North Branch Park River,
- Blue Hills Reservoir, and
- Wintonberry Reservoir



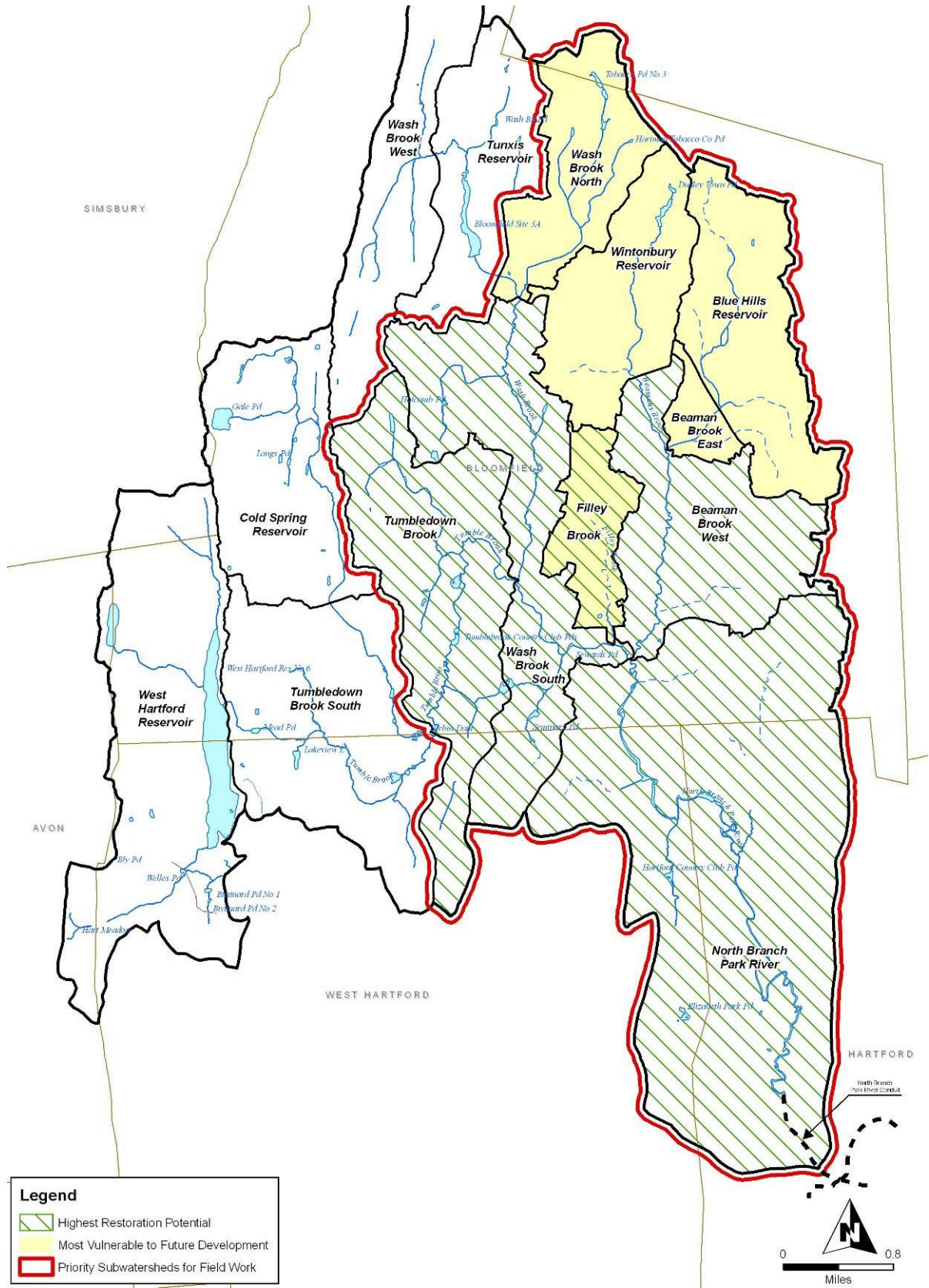


Figure 2-1. Priority Subwatersheds Targeted for Field Inventories



The stream corridor assessment procedure used in this study is adapted from the U.S. EPA Rapid Bioassessment (RBA) protocol (EPA, 1999) and the Center for Watershed Protection's Unified Stream Assessment (USA) method (Kitchell & Schueler, 2005). Upland areas and activities that may impact stream quality were also assessed using methods adapted from the Center for Watershed Protection's Unified Subwatershed and Site Reconnaissance (USSR) techniques (Wright, Swann, Cappiella, & Schueler, 2005).

The upland assessments included inventories of selected representative residential neighborhoods, streets and storm drainage systems, and land uses with higher potential pollutant loads (i.e., "hotspot" land uses). Field assessment efforts were targeted on stream segments and upland areas with the greatest potential for direct impacts to the streams. These areas were identified through aerial and land use mapping. To the extent possible, efforts were also focused on publicly-owned land, which typically offers greater opportunities for retrofits and mitigation projects as opposed to privately-owned land.

During the field inventories, crews assessed approximately thirteen miles of stream corridors, eight potential hotspot locations, ten representative residential neighborhoods, and streets and storm drainage systems associated with the residential neighborhoods and hotspot land uses. Field inventory nomenclature used throughout this report is summarized in *Table 2-1*. Results of the field inventories are summarized graphically by subwatershed (*Appendix A*). Copies of completed stream and upland assessment forms are provided in *Appendix B* and *Appendix C*, respectively. Photographs of specific or representative pollutant sources and problem areas are included throughout this document for illustrative purposes. All of the photographs taken during the field inventories are included on a CD in *Appendix D*.

Table 2-1. Field Inventory Nomenclature

Beaman Brook East	BBE
Beaman Brook West	BBW
Blue Hills Reservoir	BHR
Filley Brook	FYB
North Branch Park River	NBP
Tumbledown Brook	TDB
Wash Brook North	WBN
Wash Brook South	WBS
Wintonbury Reservoir	WTR
Reach Level Assessment	RCH
Channel Modification	CM
Severe Bank Erosion	ER
Impacted Buffer	IB
Stormwater Outfall	OT
Stream Crossing	SC
Trash & Debris	TB
Utilities	UT
Hotspot Investigation	HSI
Neighborhood Site Assessment	NSA
Streets and Storm Drains	SSD
Retrofit Reconnaissance Inventory	RRI



2.1 Summary of Findings

A variety of common issues and problems were identified during the field inventories. Some prevalent issues throughout the watershed are described below. These findings will be used to guide the development of recommendations for the Watershed Management Plan.

- Overall, in-stream habitat in the assessed reaches varies significantly. In some cases, adjacent reaches in the same general area, or even in series, are characterized by sharply-contrasting in-stream habitat quality. The level of riparian encroachment appears to be directly related to the quality of the in-stream habitat for a given stream reach. For example, reaches NBP-10 and NBP-11 along the main stem of the North Branch Park River are rated marginal and poor, respectively, whereas NBP-12, which is located less than a mile downstream, is the highest-rated reach in the overall watershed. The reasons for these differences vary, but in general, stream reaches in the watershed with wider and more natural riparian corridors generally exhibit with more stable stream banks and higher-quality in-stream habitat.
- Several instances of recent, significant stream channel modifications were observed. Two did not appear to follow applicable best management practices, such as erosion and sediment controls, and appropriate planting and seeding following completion. The third appeared to involve unnecessary fill.
 - Reach WBS-04 appears to have been 'landscaped' in one section, with landscape features placed directly in the stream channel and newly-planted grass areas down to the water's edge. Heavy machinery tire tracks entering the stream suggest a recent sediment dredging operation. Soil stockpiles are located adjacent to the stream banks with no erosion and sediment controls. This site is likely to be susceptible to significant bank erosion since vegetation has been removed and soils disturbed. Accumulation of sediment in the channel bottom is also likely since the channel hydraulics have been modified to slow flow velocities.
 - The downstream end of Reach NBP-19 appears to have been recently modified through armoring the banks with riprap and concrete blocks and removing riparian vegetation. The work appears to have been performed to repair the entrance to a culvertized section of the stream. This site may be a good candidate for bank stabilization and riparian restoration.
- A recently constructed riprap bank was observed on the west side of the University High School magnet school, along a side channel of the North Branch Park River. The work was performed for flood storage mitigation to obtain a Flood Management Certification for the site, since floodplain fill was required elsewhere on site. This site may be a potential candidate for stream bank and riparian plantings.
- Dumping of trash and debris in and adjacent to the stream is a significant problem. In more urbanized areas of the watershed, widespread areas of trash and associated debris were observed within the stream corridor, whereas in more suburban settings, trash and illegal dumping appears to be more isolated such as near hotspot locations with poor visibility from roadways and buildings.



- Fairly long continuous stream reaches exist along the main stem of the North Branch Park River upstream of the entrance to the North Branch Park River conduit at Farmington Avenue. One reach, from the conduit entrance to the dam at the University of Hartford is 3.6 miles in length with no significant obstructions to resident fish and aquatic organisms. The next reach begins at a small weir approximately 1/10th of a mile upstream of Sunny Reach Drive, and continues upstream through and beyond the confluences of the North Branch Park River main stem with Filley Brook, Wash Brook, and Beamans Brook, providing approximately 3.1 miles of unobstructed stream. However, in other areas, obstructions such as road crossings, dams, and long culvertized reaches exist along the river that limit or prevent passage of fish and other aquatic organisms. These obstructions could be modified to improve passage of eel and resident fish species. Additionally, several of the dams no longer serve a purpose, and removal could benefit in-stream habitat and fish passage.
- Segments of some streams in the watershed are buried in underground conduits, resulting from historical development and past storm drainage practices. A limited number of these reaches offer potential opportunities for daylighting and stream restoration to enhance aquatic and wildlife habitat, improve aesthetics, and provide educational opportunities. Potential candidates for daylighting include portions of a reach between NBP-11 and NBP-19 near Weaver High School and Mark Twain Elementary School.
- Stream buffer encroachments are prevalent along stream corridors in many areas of the watershed and are most often associated with residential, commercial, institutional, and industrial development and roads. Residential lawns and some commercial lawns extend down to the banks of the stream in many areas, particularly in residential back yards and golf courses. Yard waste such as grass clippings, leaves, and brush and waste materials were also common occurrences in and near these areas where easy access exists to the streams. Education, signage, stream buffer regulations, and stream cleanups are potential approaches for improving buffer management. Existing commercial and institutional parking lots, which were often observed to be underutilized, are also common within and adjacent to the riparian area and floodplain of the North Branch Park River.
- Lawn-care maintenance practices in some residential areas of the watershed are typically high. Manicured lawns are common in medium- to low-density residential areas, suggesting the prevalent use of fertilizer and other lawn care products, as well as permanent irrigation systems. Opportunities exist to educate the public about the impacts of lawn care practices on water quality and to encourage the use of residential lawn care best management practices, with the objective of reducing excess fertilizer runoff and the overall quantity of runoff from residential lawns.
- A large number of institutional facilities are located within the North Branch Park River watershed (elementary schools, secondary schools and universities, corporate campus facilities, hospitals, etc.), accounting for approximately 10 percent of the land area in the watershed. These facilities are major land owners whose grounds management



practices can have a significant impact on the water quality of the North Branch Park River. Opportunities exist to educate these land owners about the impacts of grounds management practices on water quality and to encourage the use of organic turf management and land care techniques, integrated pest management, and recommended practices related to grass clippings management, leaf/brush waste management, parking lot and road maintenance (deicing, snow management), and drainage system maintenance.

- Parking lots associated with existing commercial development, municipal and institutional land uses, as well as a commuter parking area in Bloomfield are potential candidates for stormwater retrofits to reduce site runoff and improve water quality through the use of bioretention, water quality swales, buffer strips/level spreaders, and other small-scale Low Impact Development (LID) and green infrastructure approaches. Candidate stormwater retrofit sites exist in virtually all of the assessed subwatersheds but are most prevalent in the North Branch Park River, Wash Brook South, Filley Brook, and Tumbledown Brook subwatersheds.
- The field assessments identified few areas in the watershed where storm drains are stenciled or watershed stewardship signage exists. Storm drain stenciling and/or stewardship signage could be expanded to other areas of the watershed, targeting commercial areas such as the Copaco shopping center and residential subdivisions, especially in the southern portions of the watershed. Interpretive educational signage is also recommended in key public areas of the watershed.
- Residential roofs appear to contribute significant quantities of stormwater runoff to the storm drainage system, particularly in higher-density residential neighborhoods with smaller yards and lots with a high percentage of impervious cover. In the older neighborhoods of Hartford and eastern portions of West Hartford, roof leaders of many residences appear to direct roof runoff into the internal plumbing of the structure or into iron pipe bells protruding from the ground immediately adjacent to the structure foundation, which are indicative of connections to the sanitary sewer system. Opportunities exist to disconnect residential rooftop runoff from the sanitary sewer system and/or combined sewers, as well as from the storm drainage system altogether, by redirecting the runoff to pervious areas or through the use of rain barrels or rain gardens.
- In mid-20th century residential neighborhoods, concentrated in West Hartford and Bloomfield, most of the developed areas surveyed have inadequate stormwater quality controls. Many of the residential developments were constructed prior to the advent of modern stormwater quality regulations and design requirements. Therefore, most of the development observed in the watershed employs traditional curb and gutter storm drainage collection systems with little, if any, stormwater management beyond deep sump catch basins.
- Although conventional stormwater drainage systems are prevalent throughout the watershed, there are also several examples of Low Impact Development practices in the watershed. One example of a grassroots LID practice is a recently-installed rain



garden at the Greater Hartford Classical Magnet School. The rain garden receives runoff from an adjacent school parking lot. The rain garden is in a highly visible location and, although its storage volume is limited, it appears to be capturing and removing sediment. This rain garden provides educational opportunities as a local LID demonstration project. Several additional sites in the watershed with LID practices include the Annie Fisher School and Mark Twain House & Museum in Hartford. Other recent development projects have implemented stormwater controls consistent with the *Connecticut Stormwater Quality Manual*, including the University High School along Mark Twain Drive and the Mark Twain Drive roadway extension, which incorporate a combination of wet stormwater detention basins with sediment forebays and water quality swales.

- Areas of moderate to severe streambank erosion were observed in the North Branch Park River, Blue Hills Reservoir, Filley Brook, Wash Brook South, and Wintonbury Reservoir subwatersheds. Most of these areas are located at or downstream of stormwater outfalls or in areas with riparian buffers that are severely compromised. Several of these reaches offer good opportunities for stream restoration projects. Access to some of these areas is limited; therefore, potential candidate sites for bank stabilization projects and other types of stream restoration should be evaluated further for overall feasibility.
- Hotspot land uses and facilities were observed throughout the watershed, including several commercial shopping centers, industrial facilities, the Town of Bloomfield garage facility, and large public and institutional commuter parking areas. Many of these facilities discharge stormwater directly to receiving waters with no treatment or peak flow control, and the level of maintenance of existing controls in some areas is poor.

The following sections present a more detailed discussion of the stream corridor and upland assessment methods and findings.

2.2 Stream Corridor Assessment

Stream corridors within the North Branch Park River watershed were assessed on November 23, 24, and 30, 2009 and December 1, 3, and 8, 2009. Weather on December 1 and 8 was partly cloudy and cool (approximately 40°F); weather on November 23, 24, and 30 and December 3 was rainy and cool (approximately 40°F). Field crews consisted of staff from New England Environmental, Inc., working in pairs. Stream corridors were assessed along selected reaches within priority subwatersheds using methods adapted from the U.S. EPA Rapid Bioassessment (RBA) protocol (EPA, 1999) and the Center for Watershed Protection's Unified Stream Assessment (USA) (CWP, 2005).

The stream assessments were used to evaluate stream reaches for impacted conditions. The method used in this study consisted of a continuous stream walk for each reach, generally moving upstream within the channel or along the bank, to identify and evaluate the following impact conditions:



- Outfalls (OT), including stormwater and other manmade point discharges;
- Severe Bank Erosion (ER), such as bank sloughing, active widening, and incision;
- Impacted Buffer (IB), which is a narrowing or lack of natural vegetation;
- Utilities in the stream corridor (UT), such as leaking or exposed pipes;
- Trash and Debris (TR), such as drums, yard waste, and other illegal dumping;
- Stream Crossings (SC), which are hard objects, whether natural or artificial, that restrict or constrain the flow of water. These may include bridges, road crossings with the stream piped in a culvert, dams, and falls;
- Channel Modification (CM), where the stream bottom, banks, or direction have been modified;
- Miscellaneous (MI), other impacts or features not otherwise covered; and
- Reach Level Assessment (RCH), the average characteristics of each reach.

This stream assessment method also includes a semi-quantitative scoring system as part of the reach level assessment to evaluate the overall condition of the stream, riparian buffer, and floodplain, based on a consideration of in-stream habitat, vegetative protection, bank erosion, floodplain connection, vegetated buffer width, floodplain vegetation and habitat, and floodplain encroachment.

Field data forms were completed for each stream reach assessed (*Appendix B*). The information was compiled and used to quantify the overall condition of stream corridors in the watershed, compare subwatersheds within the watershed to each other, and prioritize areas for restoration, stormwater retrofits, land preservation, and other stewardship opportunities.

Stream reaches were assigned a subwatershed abbreviation followed by a two-digit numerical identifier. Reaches were generally numbered sequentially from upstream to downstream in series by stream order. A reach was considered to be a stream segment with relatively consistent geomorphology and surrounding land use, and generally one-half mile in length. Features noted at reach junctions (e.g., culvert crossings) were associated with the downstream reach. Impact conditions within each reach were numbered sequentially with an abbreviation followed by a two-digit number. For example, the second stream crossing in a reach would have the identifier SC-02.

Thirty-two stream reaches were evaluated in the North Branch Park River watershed using this stream assessment protocol. The reaches assessed are shown in *Figure 2-2*. *Table 2-2* summarizes the number of impact conditions identified and reach level assessments that were performed within each subwatershed.



North Branch Park River Field Assessments

Data sources: Town of Bloomfield,
CTDEP and CTDPS (TeleAtlas).
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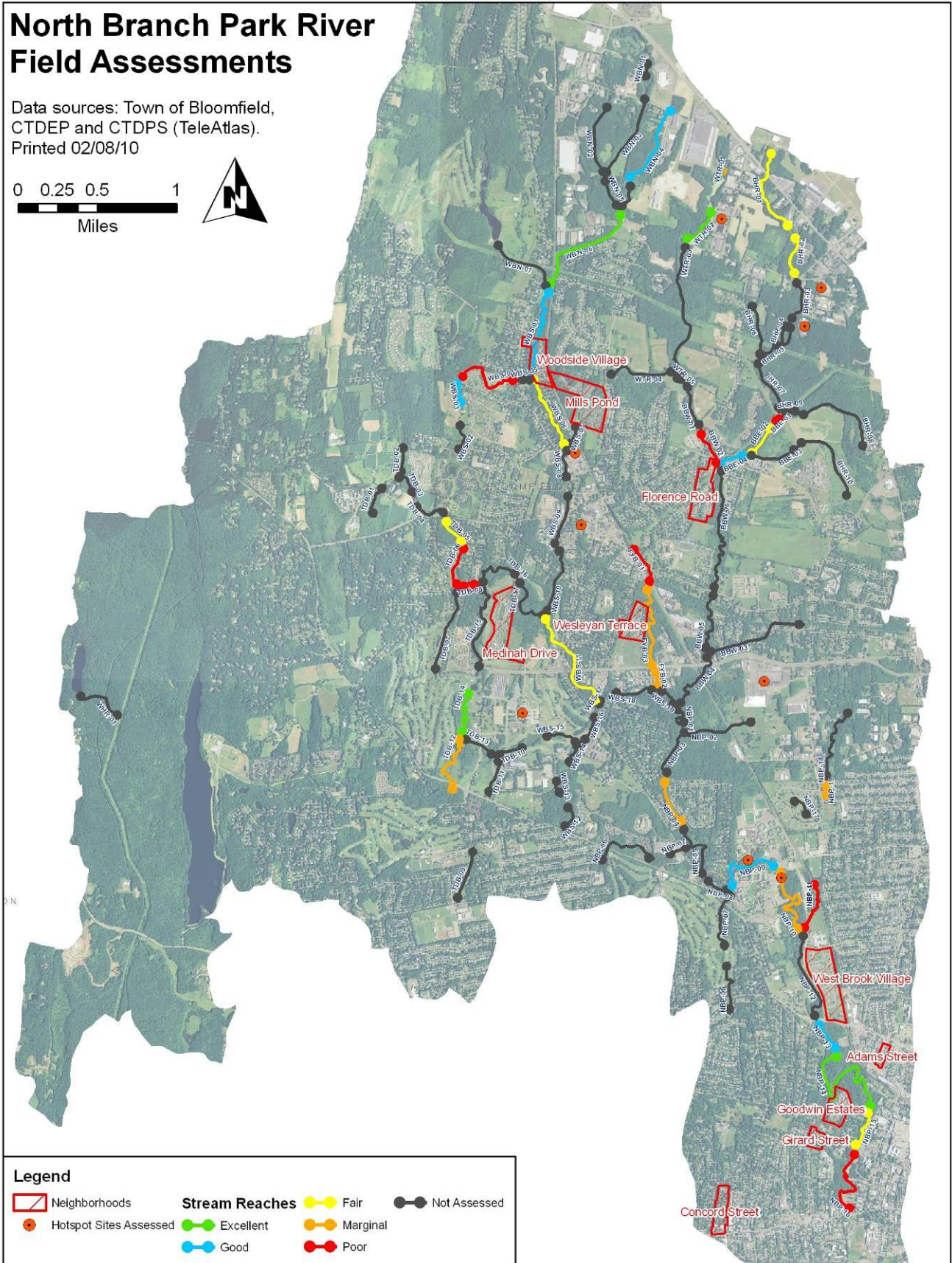
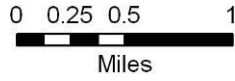


Figure 2-2. Stream Assessment Summary



Table 2-2. Number of Reach Level Assessments Performed and Impact Conditions Identified

Subwatershed	RCH	CM	ER	IB	OT	SC	TR	UT
Beaman Brook East (BBE)	3	0	0	0	1	2	1	0
Beaman Brook West (BBW)	1	0	0	2	2	1	0	0
Blue Hills Reservoir (BHR)	2	0	0	0	0	0	0	0
Filley Brook (FYB)	3	0	2	8	36	4	2	0
North Branch Park River (NBP)	9	1	1	17	28	8	2	1
Tumbledown Brook (TDB)	5	0	0	0	0	0	0	0
Wash Brook North (WBN)	2	0	0	0	0	0	0	0
Wash Brook South (WBS)	5	1	3	16	6	11	2	0
Wintonbury Reservoir (WTR)	2	0	0	0	0	0	0	0

Reach level assessment scores were assigned by field crews based upon the overall stream, buffer, and floodplain conditions. A subjective determination of eight criteria is assessed on a scale of 0 to 20; 0 indicating poor conditions and 20 being optimal conditions. The total of these scores provides a quantitative index of overall stream health and condition. The maximum possible number of points that would be assigned for a fully optimal stream reach is 160 points.

Streams were assessed relative to a base condition, which for this study, is the highest scoring stream reach in the North Branch Park River watershed (141 points). All other assessed stream reaches were assigned a numerical score and categorized relative to the statistical percentiles (*Table 2-3*) of the obtained dataset. Reaches scoring greater than the 90th percentile (140 points) are considered "excellent", between the 75th and 90th percentile are categorized as "good", between the 50th and 75th percentile are categorized as "fair", and between the 25th and 50th percentile are categorized as "marginal." Total reach scores of less than the 25th percentile (96 points) are categorized as "poor". *Table 2-4* summarizes stream reach assessment scores and classifications for the assessed stream reaches. The stream assessment results for the entire watershed are also shown graphically in *Figure 2-2*. *Appendix A* contains maps depicting the stream assessment results in each subwatershed.

Table 2-3. Stream Reach Classifications

Category	Percentile	Point Threshold
Excellent	90%	≥ 140
Good	75%	≥ 127
Fair	50%	≥ 119
Marginal	25%	≥ 96
Poor	< 25%	< 96



Table 2-4. Stream Reach Assessment Scores and Classifications

Excellent		Good		Fair		Marginal		Poor	
Reach ID	Score	Reach ID	Score	Reach ID	Score	Reach ID	Score	Reach ID	Score
NBP-14	141	WBN-04	138	NBP-15	126	NBP-04	116	TDB-06	95
TDB-14	140	NBP-13	135	WBS-06	126	FYB-03	107	BBW-02	94
WBN-06	140	BBE-04	132	TDB-05	125	WTR-01	107	NBP-11	88
WTR-02	140	NBP-09	127	WBS-11	123	TDB-12	105	FYB-01	86
		WBS-01	127	BHR-02	122	NBP-10	102	TDB-08	84
		WBS-03	127	BHR-01	120	FYB-02	97	BBE-01	83
				BBE-02	118	NBP-19	97	WBS-04	61
								NBP-16	56

The North Branch Park River subwatershed contains stream reaches in all five of the assessed categories, which underscores the high degree of variability in stream conditions along the main stem of the North Branch Park River. As indicated in *Table 2-4*, North Branch Park (NBP-14) is the highest rated stream reach (“Excellent”) due to mature floodplain forest along a wide riparian corridor. NBP-13 also received a high score, but the floodplain is more impacted and the banks somewhat eroded such that the reach is rated as slightly lower (“Good”). NBP-15 is considered “Moderate” since it has similar in-stream conditions to NBP-14 but with additional encroachments due to parking lots and maintained lawns adjacent to the banks, as well as trash, stormwater outfalls, and invasive species within the riparian corridor. NBP-10 is rated “Fair” due to bank erosion and impacted riparian buffers. NBP-16 is the lowest-rated reach in the North Branch Park River subwatershed, as well as the overall watershed, since it suffers from a range of problems due to extensive suburban and urban development. The photographs in *Figure 2-3* illustrate the sharp contrast in conditions within this subwatershed.

The following sections summarize the major issues identified during the stream corridor assessments for each priority subwatershed. Specific locations are identified according to the stream reach and impact condition IDs described previously. Identification of “right” and “left” stream banks is from the observer’s perspective facing downstream.





NBP-14: Excellent



NBP-13: Good



NBP-15: Fair



NBP-10: Marginal



NBP-16: Poor overall condition, with little connectivity to the floodplain, modified bank habitat, and numerous outfalls

Figure 2-3. Examples of Stream Reaches in Various Classification Categories

2.2.1 Blue Hills Reservoir

Blue Hills Reservoir (BHR) reach BHR-01 is the northernmost in the subwatershed and flows from north to south. It begins at a pond on the north side of Route 187/Blue Hills Avenue. Water flows from the pond through a clogged culvert under Blue Hills Avenue. The outflow forms a clearly-defined channel through a wooded area, flows under an old farm road and 24-inch culvert, then becomes sinuous through an alder swamp and then a cattail marsh prior to its terminus at a cattail pond.

In general, the stream reach assessment score of BHR-01 is "Fair," with optimal stream vegetative protection and floodplain buffer width, but with minor bank erosion and some floodplain encroachment. The greatest concern is trash and debris scattered through the lower part of this reach. Materials observed included automobiles and auto parts, plastic and styrofoam. A particularly bad area of dumping is located behind an Alvin & Company building (on the left bank of the stream), where the topography slopes steeply from the back of the parking lot. This slope contains trash, concrete, asphalt, appliances (including a washing machine, air conditioners, etc.), metal pipe, styrofoam, telephone poles, and sheets of plastic. The trash and debris is present in the stream channel itself. Farther upstream, runoff from the back of a Dudley Town Road site has resulted in soil erosion adjacent to the right bank in the middle of this reach, and sediment has filled wetlands and entered the stream channel.

BHR-02 begins at a 24-inch diameter culvert which drains the above-mentioned cattail pond through a small earth-embankment dam. Gravel fill is located in the stream channel for approximately 30 feet downstream of the culvert. The stream flows through red maple swamp and a *Phragmites* stand on the right bank, and several unnamed tributaries join BHR-02 as it flows southward through a relatively undisturbed, open wooded stretch. This reach ends at a culvert below West Dudley Town Road.

Trash and debris were observed in many areas along this reach. Materials observed included automobile parts, oil drums, and garbage barrels. This reach is also rated "Fair," since vegetative protection is optimal but soil erosion and sedimentation and dumping are significant problems. Reach accessibility from public areas is difficult; however, landowners adjacent to the more significant dumping sites may be encouraged to clean areas adjacent to their properties via their private parking lots.

The following specific deficiencies were identified for reaches in the Blue Hill Reservoir subwatershed:

BHR-01

- Dumping and significant trash behind commercial buildings and heavy sediment deposition due to runoff from Route 187 and Dudley Town Road industrial site.

BHR-02

- Dumping and significant trash on the right bank, including oil drums with unknown contents. *Phragmites* was observed in the same area.



2.2.2 Beaman Brook East

Beaman Brook East (BBE) flows from northeast to southwest. The BBE reaches were assessed upstream from the downstream end of BBE-04, to BBE-02, and finishing at the upstream end of BBE-01. Flow into BBE-01 begins at a 24-inch concrete culvert that is the discharge from the Blue Hills Reservoir. The stream flows through wet meadow and shrub wetlands under high-tension powerlines. An unnamed tributary joins BBE-01 at the start of BBE-02. Stream reach BBE-02 then flows through a red maple swamp to the confluence with BBE-03 (not assessed) where BBE-04 begins. BBE-04 flows southwesterly past powerlines and residential areas, then through a corrugated metal pipe below Wintonbury Avenue to its confluence with BBW-02. This confluence forms the beginning of BBW-06.

The stream reach assessment scores indicate "Poor" condition for BBE-01, "Fair" condition for BBE-02, and "Good" condition for BBE-04. The in-stream habitat was difficult to assess since the stream channel was submerged and turbulent at the time of the field assessment, especially in BBE-01 and BBE-02. The stream substrate generally consists of silt and clay materials.

The buffer and floodplains of BBE-02 were well-vegetated; however, BBE-01 and part of the BBE-04 floodplain is actively managed to maintain clearance between the power lines and vegetation, such that the stream is poorly shaded. The riparian area of BBE-04 is also impacted by adjacent residential lawns.



BBE-01: Electric utility line vegetation maintenance in the riparian area.

As observed during the assessment (i.e., a period of high flows), the stream is able to overflow and inundate the floodplain during high water conditions, and the stream flows at 75-100% of the channel width. Access to BBE-01 is considered good, given the dike and lack of canopy. BBE-04 is accessible from Wintonbury Avenue, but is surrounded by private landowners. Access to the channel of BBE-02 is limited by the surrounding forested wetland, but access to an abandoned car might be possible through the adjacent power line easement.

The following issues were observed in the BBE reaches:

BBE-01

- Stream channel lacks tree canopy and shading, which may lead to increased stream temperatures, although canopy improvements are limited by the need to ensure electrical transmission line reliability.

- The banks at the beginning of the reach are subject to high velocities (downstream side of the dike), making the adjacent portion of the reach susceptible to erosion and downstream sedimentation.

BBE-02

- Abandoned, junk car located on the right bank.
- Heavy sediment loading (following storm); origin is likely upstream bank erosion.

BBE-04

- Mown lawn, piped tributary on right bank north of Wintonbury Avenue, heavy sediment loading, invasive plants.

2.2.3 Beaman Brook West

Beaman Brook West (BBW) flows from north to south. The northern portion of the subwatershed is generally forested until the upstream end of reach BBW-02. The stream continues south through a residential area and past an elementary school, with landscaped lawns on both sides of the stream. The channel flows through a 5-foot diameter corrugated metal pipe under Filley Street, then past residential areas, where maintained lawns, yard waste, illicit non-stormwater inputs to the stream from residences (including an above ground chlorinated swimming pool draining directly into the stream channel), and stormwater inputs line the stream banks. BBW-02 continues through a 5-foot corrugated metal pipe under Wintonbury Avenue and ends at the junction of BBW-06, BBE-04 and BBW-02, approximately 150 feet south of Wintonbury Avenue in Bloomfield, in an open, mown area.

Reach BBW-02 was assessed in this subwatershed. The stream conditions are rated "Poor," due to the lack of riparian vegetation and floodplain encroachment. Access to BBW-02 is considered fair since the brook flows through many open areas; however, much of the adjacent land is privately-owned.

The following issues were observed in this reach:

BBW-02

- Lack of natural vegetation and numerous mown lawns in the riparian corridor, yard waste behind private residences is piled up on the stream banks or in the channel, and one private landowner observed draining their swimming pool directly into the stream channel.

2.2.4 Filley Brook

Filley Brook (FYB) flows from north to south. Reach FYB-01 is the most upstream reach. The headwaters portion of this reach flows through meadow and shrub habitat in old fields, crosses under Park Avenue via three parallel culverts, and then enters a subreach where it is encroached upon by roads, power lines, and railroad tracks. Impacts in this last section include trash, recent clearing and regrading on the left bank under the power lines, and riprap placed in the channel alongside the railroad tracks. This reach is rated "Poor" on average, with the most severe deficiencies located in the downstream portion south of Park Avenue.



FYB-03 flows from the culvert under the railroad tracks to Cottage Grove Road (Route 218), through woodlands and shrub habitat, with a major subdivision to the west and commercial development to the east. Old farm land is located west of the stream along Cottage Grove Road. The banks of the stream are significantly eroded, and some are modified with riprap. These impacts appear to be related to stormwater discharges to the brook. The condition of this reach was rated as "Marginal." The channel condition and in-stream habitat are impacted, although the floodplain is wide with good vegetative cover.

FYB-02 (numbered out of sequence) is the most downstream reach and begins at a double concrete culvert under Cottage Grove Road. This short reach is heavily impacted throughout its length, with trash, debris dams, deep channel scouring, and sediment accumulation. The riparian area is encroached upon to the west by a residential apartment complex and to the east by a commercial development. This overall reach condition is "Marginal" to "Poor."

The following issues were observed in these reaches:

FYB-01

- Degraded buffer, bank, and channel substrate south of Park Avenue.

FYB-02

- Eroding channel and debris dams and trash along the stream.
- Fence too close to stream, potentially impacting wildlife movement in the riparian area.
- Stormwater from east is eroding slope.

FYB-03

- Channel erosion and sedimentation resulting from numerous stormwater discharges, via both pipe outfalls and overland flow.

2.2.5 Tumbledown Brook

The Tumbledown Brook (TDB) subwatershed is characterized by a relatively complicated hydrology. The brook's main stem begins in adjacent subwatersheds and enters the Tumbledown Brook subwatershed near the intersection of Routes 185, 173, and 218. A minor tributary also flows south from its headwaters in the northern portion of the subwatershed. Two reaches of the main stem were assessed, as were three reaches of the north tributary.

The main stem flows out of the Tumbledown Brook South subwatershed at reach TDB-12 and passes under the road in a large double-box culvert. It then flows between old fields and shrubby areas, past a golf course on the right (west) bank, and ending in a wooded area where a tributary (TDB-13) joins from the east. TDB-14 continues flowing through shrubby overgrown fields and adjacent forest, terminating at a golf course pond. Reaches TDB-12 and TDB-14 are rated "Marginal" and "Excellent," respectively. Healthier stands of in-stream aquatic vegetation were observed in these two reaches than in any other reaches assessed in the watershed.

The following issues were observed in these reaches:



TDB-12

- Bank stabilization/channel modification using riprap at a bank bend.
- Outfall pipe at eroded bend adjacent to golf course.
- Trash originating at the adjacent golf courses.

TDB-14

- Bank stabilization/channel modification using riprap at a bank bend.
- Significant floodplain encroachment present, predominantly in the northern portion of the reach along the right bank.

TDB-05, TDB-06, and TDB-08 flow through a predominantly residential area and join the main stem at the junction with TDB-15 near Medinah Drive at the Greens at Gillette Ridge residential development. TDB-08 extends upstream from this junction in a narrow wooded area. The brook is modified with riprap as it approaches Maple Avenue. Upstream from the culvert under Maple Avenue, the brook meanders between mown lawns on the left bank and shrubs/young forest on the right bank, ending at a small tributary entering the right bank. TDB-06 turns northerly through a wooded area, then emerges into an open park or recreational area, where the channel is often filled with cat-tails and the surrounding buffer is mown. This reach then passes through a culvert under Mallard Drive, flows through residential back yards, and then flows through another culvert and ends on the north side of Sandpiper Drive. TDB-05 then passes through a shrubby, young forested area before ending at Loeffler Road. Multiflora Rose dominates much of the riparian corridor in this area, and the stream channel is somewhat unstable, subject to debris dams and scouring. Dumping was observed in two areas. Because the surroundings are undeveloped and well-vegetated, TDB-05 is rated as "Fair," while TDB-06 and TDB-08 are rated as "Poor."

The following items summarize observations for these reaches:

TDB-08

- Riprap along the stream on the east side of Maple Avenue.
- Mown lawn up to the bank in the yard west of Maple Avenue.

TDB-06

- Mown lawns to the edge of the stream.

TDB-05

- Dumping.
- Invasive plants (Multiflora Rose, Barberry, Japanese Knotweed, Garlic Mustard).

2.2.6 Wash Brook North

Wash Brook North flows from northeast towards southwest, beginning at a ponded area north of West Newbury Road and terminating at the junction of WBN-07, WBS-01 and WBN-06, west of the railroad tracks and south of the high tension power lines. WBN-04 begins at a culvert under West Newbury Road and flows past several residential properties. Yard waste



and general trash is common throughout these residential areas. The brook flows through a 70-foot long underground culvert, which is located under two residential driveways. South of this culvert, the brook meanders through mossy and hummocky wetlands. In general, the brook has optimal habitat, vegetation, floodplain connection, and riparian buffer.



WBN-04: A high-quality, scenic portion of the reach.

Residential homeowners have built small retaining walls along the stream banks, dumped trash (bleach bottles, plastic bottles, tanks, etc.), and built small footbridges over the stream channel in various locations. Red maple swamp abuts the brook as it flows further south towards an area of dumping located off of the left bank. This dump site includes tires, an old car, a stove, an old foundation, broken pipe, and other debris. The uplands surrounding this stretch of the brook consist of mature mixed hard and softwoods with an open understory and wide forested buffer surrounding the channel. A

Boy Scout Cabin is located on the right bank of the stream channel, and a bridge crosses the brook. This reach ends at a culvert that flows under the unpaved Mucko Road. In general, stream conditions are rated as "Good" in this reach.

WBN-06 begins at the junction of WBN-04, WBN-05 and WBN-06 at a culvert north of Peters Road. The brook flows southwesterly through a braided channel surrounded by marsh wetlands and residential homes, then southerly through a wide deep marsh until its downstream end. The stream flows parallel with the railroad tracks for approximately 800 feet, where tree canopy is lacking and the stream banks are impacted by riprap along the slopes of the tracks. The stream is surrounded by deep marsh until its intersection with a railway embankment, where the stream flows under the tracks to cross to the east. The stream crosses beneath the power line right-of-way through a series of three culverts. South of the intersection with the railroad tracks and the power lines, the stream buffer transitions to forested swamp and terminates at the confluence of WBN-07 and WBS-01.

The stream conditions in WBN-06 are rated as "Excellent," although both Wash Brook North reaches are generally rated high. The in-stream habitat was rated near 90% for WBN-06 and greater than 90% for WBN-04; the buffer/floodplain habitat was rated near 85% for both. Both reaches are surrounded by a variety of habitat types, including forested wetlands, deep marshes with dead snags, wet meadow, tussock, mossy areas with pit-and-mound topography, and forested uplands with a mature tree canopy.

The following issues were observed in these reaches:

WBN-04

- Significant trash and dumping behind residential homes parallel to Woodland Avenue. There is an old farm dump located on the left bank of the stream channel parallel with Woodland Avenue.

WBN-06

- Yard waste dumping along the left bank just south of Peters Road.
- Impacts related to the railroad tracks.

2.2.7 Wash Brook South

Five of the Wash Brook South (WBS) reaches were assessed, all of which are located in Bloomfield. WBS-11 is a downstream reach of the main stem, near the intersection of Cottage Grove Road and Bloomfield Avenue, WBS-01 and WBS-06 are farther upstream on the main stem, east of Tunxis Avenue, and WBS-03 and WBS-04 are along a western tributary flowing adjacent to and through residential areas west of Tunxis Avenue.

WBS-11 shows evidence of erosive instability throughout, but especially in the downstream portion, south of Cottage Grove Road. Some of this section runs over bedrock, and the adjacent bank and slopes have been reinforced by riprap and gabions, primarily on the left bank near a medical center and along the right bank where the brook flows close to Bloomfield Avenue. In spite of the armoring, slope failures are present between the stream and the road.



WBS-11: Steep bank reinforced with gabions.

Wash Brook is less impacted upstream of Cottage Grove Road, with some riprap on the left bank on the upstream side of the Cottage Grove Road culvert, and some undercut large trees on the left bank as the stream turns west just downstream of a culvert under Bloomfield Avenue. West of Bloomfield Avenue, Wash Brook flows through a golf course and then a forested area. Despite the bank erosion, WBS-11 is rated as "Fair" due to relatively high in-stream habitat, floodplain vegetation, and habitat scores.

WBS-06 and WBS-01 flow through a largely forested corridor between residences along Tunxis Avenue and residential development to the east. Areas of wetlands are located on both sides of the brook, along both reaches. The downstream end of WBS-06 is located near the confluence of WBS-08 and the tributary WBS-07, northwest of a grocery store parking lot. The lower section of the reach, between the parking lot and Mills Lane, exhibits minor bank erosion. Residential lawns encroach into the riparian buffer on the right bank. Additional minor bank erosion was observed on the right stream bank, and extensive colonization of the riparian buffer by *Pachysandra* was observed on the left bank. In the segment north of Mills Lane, upstream to the confluence with WBS-05 and WBS-01, WBS-01 has a more sinuous channel that winds through forested areas, with occasional minor bank erosion and adjacent residential lawns, primarily on the right bank. Multiflora Rose is abundant in some areas of both reaches. WBS-6 was rated as "Fair," while WBS-01 was rated as "Good."

The tributary associated with WBS-03 and WBS-04 flows through an area of residential development along Valley View Drive. WBS-04 terminates at a culvert near the intersection of

Brown Street, Terry Plains Avenue, and Tunxis Avenue. Upstream from this point, it flows through an old farm landscape, which still contains a horse pasture on the right bank. The stream channel has been altered and ornamented with stone and old tractor tires. Several in-stream impoundments are colonized by cat-tails. Further upstream, a pond has recently been re-excavated, with unprotected slopes and dredge piles on both sides. A culvert upstream from the pond appears to be an old farm crossing. The yards of residences on Valley View Drive are located along the right bank of the downstream segment of WBS-4. The developed riparian area contains swimming pools, yard waste, and construction debris. This reach is rated as "Poor" due to the extensive buffer impacts, channel alteration, and pond excavation activities.



WBS-04: Bank and channel modification and evidence of recent pond dredging.

In contrast, WBS-03 is in significantly better condition and is rated as "Good." Residential lawns are within the riparian area in the most downstream segment of this reach. However, the residential development along the remainder of the reach is set back from the stream, with some wet meadow and forested habitat remaining on the right bank. The left bank and buffer consist of young Red Maple swamp, mature Red Maple swamp (some of it flooded, potentially due to a blocked culvert), and some upland forest interspersed with ephemeral pools.

The following issues were observed in these reaches:

WBS-11

- Slope failure and bank erosion along Bloomfield Avenue, south of Cottage Grove Road, on the right bank.
- Slope failure and left bank erosion, near office buildings.
- Undermined roots of very large trees on left bank, downstream from the Bloomfield Avenue culvert (north of Cottage Grove Road).

WBS-06

- Residential lawns up to bank.
- Large patch of *Pachysandra* in stream buffer.

WBS-01

- Residential lawns up to bank.

WBS-04

- Mown lawn and dumping in buffer.
- Recent pond excavation, with unprotected bare slopes and dredge piles.

WBS-03

- Mown lawn in buffer and floodplain.
- Blocked culvert at residential crossing.

2.2.8 Wintonbury Reservoir

The Wintonbury Reservoir (WBR) reaches WBR-01 and WBR-02 are located on the north and south end of Dudley Town Pond, respectively. WBR-01 is relatively short, at approximately 200 feet in length. This stream reach begins at a twin culvert below an unnamed farm road and flows south in sinuous channels through a forested swamp, until the stream reaches a marsh and terminates at the Dudley Town Pond. Trash is common along this reach and generally consists of car parts, plastic bottles, plastic buckets, vinyl siding, garbage cans, and other debris. Evidence of vehicle washing was observed along this reach during the field assessment.

WBR-02 begins at the southern end of Dudley Town Pond on the opposite side of an earthen fill dam. The stream flows south through forested upland, past a new building where several washouts and soil erosion have impacted the channel and bank, under a footbridge, and finally terminates at a concrete culvert. The overall condition of reach WBR-02 is very high. However, stream downcutting and erosion below the dam culvert are concerns in this reach. The new building adjacent to the left bank has encroached on the stream buffer and stormwater runoff has impacted the channel, buffer vegetation, and bank stability.

The stream conditions are rated as "Excellent" for WTR-02 and "Marginal" for WTR-01. Access is limited to both reaches due to the forested areas adjacent to the stream channel.

The following issues were observed in these reaches:

WTR-01

- Significant trash and dumping, including automobile parts, plastic bottles, plastic buckets, vinyl siding and garbage cans behind parking areas and industrial buildings. Washouts and runoff from industrial buildings, as well as evidence of vehicle washing discharges to the stream.

WTR-02

- Downcutting of the stream channel is a concern for this reach.
- The culvert on the downstream side of the dam at Dudley Town Pond is located approximately 2 feet above the surface of the water, and erosion is occurring here.
- Buffer encroachment on left bank where construction of a new building was observed during the assessment, causing soil erosion, bank instability, and impacts to the riparian buffer.



2.2.9 North Branch Park River

Nine reaches in the North Branch Park River subwatershed were assessed. The assessed reaches include those between Route 44 and the entrance to the flood control conduit near Farmington Avenue (NBP-13, 14, 15, 16); three reaches in the vicinity of the University of Hartford (NBP-09, 10, 11); and two separate reaches farther upstream (NBP-04 and 19).



NBP-16: North Branch Park River at entrance to flood control conduit.

NBP-16 is the reach immediately upstream of the flood control conduit. This reach is highly altered, characterized by extensive attempts at channel and slope stabilization near the conduit entrance. This reach is rated as "Poor," and is the lowest-rated reach in the entire watershed. Numerous parking lots are located close to the river along the left bank. Where the bank is not armored, it is often eroding, and many large outfalls discharge to this reach. The buffer on the right bank is mostly wooded and less disturbed, except at the downstream end, where there is a steep armored slope, and slope failure where the armoring

terminates. The upstream terminus of this reach is a large, stable, double-box culvert at Asylum Avenue.

NBP-15 is a transition reach between the highly altered reach NBP-16 and the higher-quality reach NBP-14. Although still altered, NBP-15 is less impacted than reach NBP-16 and is rated as "Fair," with far less bank armoring. Institutional land uses and associated parking lots characterize the left bank of NBP-15, although the parking lots are less numerous and farther from the left stream bank as compared to NBP-16, and forested areas exist on the right bank. Where the stream buffer is impacted, it tends to be by lawns rather than impervious areas.

NBP-14 is rated as "Excellent," with the highest score of all the reaches assessed, due to the relatively stable stream channel (although erosive forces are still evident) and the extensive, mature forested riparian buffer. Some sizable stormwater pipes are located along the left bank. A sewer line also appears to cross the river near the middle of the reach.



NBP-14: High-quality reach of the North Branch Park River.

Reach NBP-13 is rated as “Good,” slightly lower than NBP-14. Reach NBP-13 has a more highly altered riparian buffer, including extensive pavement, particularly adjacent to the right bank. Several stormwater outfall pipes on the right bank are broken and eroded.

The following issues were observed in these reaches:

NBP-16

- Very unstable channel with stream bank erosion and failure, and extensive piece-meal channel armoring.
- Large stormwater outfalls, especially on the left bank.
- Extensive pavement adjacent to the left bank.

NBP-15

- Extensive paved parking lots in riparian buffer on left bank.
- Lawns close to right bank.

NBP-14

- Large deteriorating pipes on left bank near housing.
- Lawns close to right bank.

NBP-13

- Eroding pipes on right bank.
- Large parking area close to right bank.

Reaches NBP-9 and NBP-10 flow through the University of Hartford campus. NBP-11 is a tributary flowing from the east that joins the North Branch Park River just downstream of the campus. NBP-11 is highly altered and rated as “Poor,” with evidence of sediment deposition and trash throughout, and a highly-modified channel that is eroded where it is not stabilized. The riparian buffer is vegetated, although dominated by invasive Multiflora Rose. The downstream portion of the reach, adjacent to Mark Twain Drive, is in somewhat better condition. Significant sedimentation was observed in the culvert under Mark Twain Drive, to the extent that the downstream end is nearly buried.



NBP-10: University of Hartford parking lots adjacent to the North Branch Park River.

Conditions in NBP-10 are slightly better; the stream reach was rated as “Marginal.”

The river channel shows signs of instability, with eroding banks, toppled trees causing debris dams, and flows that cut through the established bank, forming an oxbow. Large parking lots are located adjacent to the right bank, and riprap, concrete, and other debris line this bank.

NBP-9 is rated as “Good,” despite ongoing development in this portion of the campus. The upper half of this reach flows over bedrock, and the lower half is

an impoundment upstream of the University of Hartford Dam. The impoundment is now dominated by an island that is likely to have formed through the deposition of sediment.

The following issues were observed in these reaches:

NBP-11

- Very unstable channel with erosion, damming, and bank failures.
- Trash in the channel and adjacent riparian area.
- Invasive plants in the stream buffer.
- Destabilizing stormwater flows from upstream – channel is concrete above this reach, and water is sediment-laden.

NBP-10

- Extensive parking in riparian area on right bank, and armoring of the right bank.
- Destabilized channel.
- Conduit across stream by parking lot.

NBP-9

- Several small stormwater pipes on right bank.
- Lawns close to left bank.

Two upstream reaches in the North Branch Park River subwatershed were also assessed. NBP-04 is a scenic, stable, and relatively undisturbed section of the main stem of the river located approximately a half-mile northwest of the University of Hartford campus. It extends from Portage Road downstream to a tributary that enters the river on the right bank. The right bank of the river is entirely wooded in this reach. However, the left bank has residential lawns that extend to the bank, with no buffer or native vegetation. This reach is rated as “Marginal” due to the impacted buffer.



NBP-19: Channel heavily and recently modified upstream of Burnham Street.

NBP-19 is a segment of a small tributary located northeast of the University of Hartford. Reach NBP-19 flows through a narrow wooded area east of Granby Street. The channel is somewhat disturbed, with broken outfall pipes and a toppled headwall, fallen trees, debris dams, and scoured banks. A major stormwater outfall pipe and eroded channel on the right bank are located near the upper end of the reach. The downstream end of the stream reach is highly altered and appeared to have been recently excavated, lined with riprap, and the channel modified with large concrete blocks on the right bank. The reach ends at a culvert under Burnham Street, which

apparently carries the river under the Joseph Cronin Playground and does not daylight the stream again nearby. NBP-19 is the lowest-rated stream in the “Marginal” category.

The following issues were observed in these reaches:

NBP-4

- Residential lawns located adjacent to the left bank.
- Erosion in one lawn near a stormwater outfall along the left bank.

NBP-19

- Stormwater pipe and eroded channel on right bank.
- Excavated and armored section before Burnham Street culvert.
- River culvertized downstream of the reach.

2.3 Upland Assessments

Fuss and O'Neill conducted upland assessments in the North Branch Park River watershed between November 19 and November 23, 2009. The field observations assist in identifying pollution prevention and potential upland restoration opportunities in the watershed. Factors that were considered in the selection of areas for assessment include:

- Stream condition (assessed during stream corridor inventory)
- Site proximity to streams and wetlands
- Land use type and development density
- Land ownership
- Restoration potential

The assessment framework was adapted from the Unified Subwatershed and Site Reconnaissance (USSR) method developed by the Center for Watershed Protection. USSR is a "windshield survey" evaluation method in which field crews drive and walk through areas of the watershed to quickly identify pollution prevention and restoration opportunities. The three major components to the upland assessments conducted in the watershed are: (1) hotspots, (2) residential neighborhoods, and (3) streets and storm drains.

The upland assessments were concentrated in the priority subwatersheds that were identified in the comparative subwatershed analysis. Locations of the upland assessments are shown on the subwatershed maps in *Appendix A*. Field data forms that were completed during the upland assessments are provided in *Appendix C*.

2.3.1 Neighborhood Source Assessment

Stormwater runoff from existing residential neighborhoods is an important consideration for this study, since residential land use is the predominant land use in the North Branch Park River watershed. Neighborhood source assessments were conducted to evaluate pollution source areas, stewardship behaviors, and residential restoration opportunities within individual residential neighborhoods throughout the watershed. The residential behaviors that affect stormwater and water quality were assessed by evaluating the following source areas in "representative" neighborhoods throughout the subwatershed:

- Yards and lawns
- Driveways, sidewalks, and curbs
- Rooftops
- Common areas

Neighborhoods were selected for assessment based on their proximity to stream corridors and their overall potential to contribute pollutants to the receiving waters. The selected neighborhoods include a variety of residential types, including low- and high-density single-family residential and multi-family residential (apartments). One field sheet was completed for each neighborhood assessed. The locations of the selected neighborhoods are summarized in *Table 2-4* and shown on the map in *Figure 2-2*.

Each neighborhood was assigned a score for pollution severity and restoration potential. Pollution severity is a measure of how much nonpoint source pollution a neighborhood is likely generating based on readily observable features such as lawn care practices, drainage patterns, pavement staining, etc. Restoration potential is a measure of the feasibility of on-site retrofits or behavior changes based on available space, number of opportunities, presence of a strong homeowners association, and other factors.

Table 2-5. Neighborhood Source Assessment Summary

Neighborhood/ Subdivision Name	Subwatershed	Residential Type	Pollution Severity	Restoration Potential
The Greens at Gillette Ridge	Tumbledown Brook	Medium density single family	Moderate	Low
Mills Pond	Wash Brook South	Medium-density, multi-family (Townhouses)	Moderate	Moderate
Woodside Village	Wash Brook South	Medium-density, multi-family (Public Housing)	Moderate	Moderate
Florence Road (off Wintonbury Road)	Beaman Brook West	Medium-density, single-family	Moderate	Low
Wesleyan Terrace	Filley Brook	Medium-density, single-family	None	Moderate
Adams Street	North Branch Park River	High-density single-family	Moderate	Moderate
Girard Street at Elizabeth Street	North Branch Park River	Low-density single-family	Moderate	Moderate
Goodwin Estates	North Branch Park River	Medium-density, multi-family (Townhouses)	Moderate	Low
Concord Street in West Hartford	North Branch Park River	High-density single family	Moderate	Low
West Brook Village	North Branch Park River	High-density, multi-family (Public Housing)	High	Low

The Greens at Gillette Ridge



This medium-density neighborhood consists of single-family residences and townhomes and is approximately 35 acres in size. It is located in the Tumbledown Brook subwatershed in Bloomfield and is associated with the Gillette Ridge Golf Course, which is located immediately to the south and west of the subdivision. The subdivision is approximately 5 years old and is not yet fully built-out. The existing homes are on approximately ¼-acre lots. The lots have approximately 50% impervious cover and approximately 30% grass cover, with intensive turf management

practices including lawn irrigation systems and the use of chemical fertilizers. There is no tree cover in this neighborhood since it was recently developed. The driveways, streets and catch basins are clean, dry and clear of trash, litter or organic debris such as leaves. All of the observed roof leaders are directly connected to the storm drain system despite the majority of the houses having adequate space for on-site rain gardens and rain barrels for watering of landscaped areas. This neighborhood is a good candidate for rain barrel and rain garden education programs, including environmentally-friendly residential lawn care and landscaping practices.

Mills Pond Townhouses

Mills Pond is a townhouse complex located on Chestnut Hill Drive and Pondsides Road in Bloomfield. The complex is approximately 20 years old with no evidence of infill or redevelopment. The neighborhood has some forest canopy and is surrounded by woods causing leaves and organic matter to collect in the curb and gutter street drainage system. An approximately 1-acre stormwater basin located along Pondsides Road receives stormwater runoff from the complex and discharges to a tributary to Wash Brook. Approximately 70% of the roof leaders drain to the turf areas on the side of the townhouses, with the remaining draining directly to driveways. In several locations, catch basins or yard drains are located within landscaped areas. In some instances there is adequate space next to the buildings for rain gardens or to receive runoff if roof downspouts are disconnected.



Woodside Village

The Woodside Village apartments are located on Dorothy Drive in Bloomfield in the Wash Brook South subwatershed. The approximately 21-acre complex is constructed along 1,500 feet



of Wash Brook. Stormwater runoff from the complex drains directly to Wash Brook without attenuation or treatment. The landscape maintenance intensity of the property was generally high, with managed turf areas and mulched gardens. Many roof leaders drain to turf areas. One roof leader was observed to drain to a turf area within 5 feet of yard drains, which is insufficient separation to effectively infiltrate runoff into the lawn.

Potential opportunities for improvements at this complex include stenciling the catch basins along the roadways and driveways, planting a wider buffer to Wash Brook along the roadside, installing rain gardens to receive stormwater from roof leaders that discharge to narrow vegetated strips, and implementing parking lot stormwater retrofits such as water quality swales or bioretention.

Florence Road (off Wintonbury Road)

The neighborhood on Florence Road off of Wintonbury Road in the Beaman Brook West subwatershed in Bloomfield has single-family homes on approximately ½-acre lots. The homes are estimated to be approximately 50 years old. The lots are approximately 30% impervious cover, 55% grass cover, and 15% tree cover (behind the homes). Many homeowners have cleared trees within the riparian area and outside of their property boundaries, as seen from 2008 aerials photographs. Field crews observed tree cutting occurring in the rear of one home during the site visit. Approximately 80% of the roof leaders drain to lawn areas adjacent to the homes. A large cul-de-sac exists at the end of Florence Road, which is a potential candidate for a vegetated traffic island or bioretention area.

A nearby electrical utility corridor crosses Florence Road. Vegetation management activities in the utility corridor have impacted the vegetative buffer surrounding stream reaches BBW-04 and BBW-06 (the adjacent BBW-02 was assessed as part of the stream assessment portion of this project). The stream downstream of this area appeared to be down-cutting, with the banks severely eroding. The cause of the impacts may be a combination of impacted buffer and stormwater discharges. Opportunities exist to restore the riparian buffer to this segment of the stream by



planting low growing shrubs and native herbaceous vegetation that are compatible with the clearance requirements within the utility corridor right-of-way, combined with modified practices for maintaining the riparian buffer within the utility corridor.

Wesleyan Terrace

Wesleyan Terrace is a 19-acre neighborhood in the Filley Brook subwatershed in Bloomfield. The neighborhood consists of single-family homes on approximately ½-acre parcels. Lawns account for approximately 40% of the lot area, and the intensity of the lawn management practices in this neighborhood is medium to high, with no evidence of permanent irrigation systems. Approximately 80% of the roof leaders drain to lawn areas. This neighborhood has little evidence of pollution potential and few opportunities for restoration. However, the development is located immediately adjacent to a reach of Filley Brook that is rated as “Marginal” due to bank erosion and poor riparian habitat. The development includes wide streets and two large, completely impervious cul-de-sacs that present opportunities for bioretention retrofits.

Adams Street

Adams Street is situated between Albany Avenue and the railroad line running along Homestead Avenue in Hartford. The homes on the 1/8-acre lots are two-family, and estimated to be 80 to 100 years old. The neighborhood is located within an area of Hartford serviced by combined sewers. Impervious surfaces comprise approximately 80% to 90% of the lots. Most of the roof leaders drain directly to driveways, which convey runoff to the combined sewer system, although several roof downspouts appeared to be plumbed into the residence, likely



entering the combined sewer system directly. This neighborhood is typical of many of the older, high-density residential neighborhoods in Hartford. Potential opportunities for improvements in this and other similar high-density residential neighborhoods include more frequent catch basin and storm drain cleaning (particularly for leaves), downspout disconnection, and lot-scale Low Impact Development practices and other green infrastructure practices such as green street retrofits.

Girard Street at Elizabeth Street

Girard Street, north of the intersection with Elizabeth Street in Hartford, is an upscale neighborhood in the North Branch Park River subwatershed. The neighborhood has an old (100-year) housing stock situated on ½ to 1.5-acre parcels. Approximately 50% to 70% of each lot primarily consists of lawn or other grass areas. Approximately 70% of the downspouts are connected directly to a partially separated stormwater/sewer line. This neighborhood has experienced localized flooding and sewer backups which may be due in part to an over-capacity combined sewer system. Tree cover in the neighborhood is generally high but varies considerably by lot (15% to 95%). There are sidewalks on both sides of the street, which may provide opportunities for bioretention and/or vegetated swale retrofits along the roadway.

Goodwin Estates



Goodwin Estates is a West End Hartford neighborhood in the North Branch Park River subwatershed. The site is a reclaimed brownfields area that was redeveloped in 2004 with townhouses and condominiums. The development is approximately 5 years old and is believed to have stormwater management infrastructure that includes underground infiltration devices for rooftop runoff. Lawns in the neighborhood are highly managed (i.e., fertilizer usage and permanent irrigation systems). The streets and sidewalks in this neighborhood are

clean of sediment and leaves. Overall, the neighborhood has a moderate pollution rating due to intensive lawn care practices, although the restoration opportunity in this neighborhood is low. The neighborhood is a good candidate for a catch basin stenciling program.

Concord Street in West Hartford

The Concord Street neighborhood is located in the North Branch Park River subwatershed in West Hartford. The ¼-acre lots are well maintained and have approximately 40-50% impervious cover, with approximately 10% of the lots consisting of landscaped planting beds, and the remaining areas consisting of grass lawns. Some lots have as much as 50% tree canopy cover given the age of the neighborhood. There are sidewalks along both sides of the tree-lined street, limiting the retrofit potential for roadside swales or bioretention.

The Concord Street neighborhood may be good candidate for rain barrel retrofits since roof leaders are likely connected directly to the combined sewer system and there are large landscaped areas that could be watered with the collected rainwater. It is recommended that the catch basins be stenciled in this area following the sewer separation along Concord Street (MDC sanitary sewer mapping indicates that sewers along Highland Street to the east and Walbridge Road to the west have been separated, while the Concord Street storm and sanitary sewers remain combined).



West Brook Village



West Brook Village is a public housing development in Hartford located off of Mark Twain Drive and adjacent to the North Branch Park River. The development is mostly vacated, and the Hartford Housing Authority is reportedly working to negotiate the sale of the property. The property is utilitarian, with only the housing structures, lawns and roadways on the property with no landscape plots and a few sparse trees. Runoff from this site drains to the North Branch Park River, which is located nearby across Mark Twain Drive, without

treatment or detention. This and similar public housing developments provide opportunities for urban renewal pilot projects that could incorporate low impact development and green infrastructure elements.

2.4 Hotspot Site Investigation

Hotspot site investigations were conducted for representative sites with higher potential to contribute polluted stormwater runoff to the storm drainage system or receiving waters. The purpose of the investigation was to qualitatively assess the potential for stormwater pollution from previously identified commercial, industrial, municipal or transportation-related sites. The hotspot investigation was limited in scope to representative hotspot facilities in order to evaluate and illustrate common issues. The investigation was not intended to be an exhaustive review of all potential hotspot facilities in the entire watershed nor a detailed inspection or audit of each facility, which are beyond the scope of this study.

The hotspots examined in the field were located within the North Branch Park River, Tumbledown Brook, Wash Brook South, Blue Hills Reservoir and Wintonbury Reservoir subwatersheds. Representative priority hotspots were selected to cover a range of watersheds and land uses, including transportation-related, commercial, industrial, institutional, and community/municipal sites. Sites are identified by the watershed abbreviation, followed by "HSI" and a numeric identifier. *Table 2-6* summarizes the selected hotspots that were evaluated. Several of the sites that were investigated are privately-owned, and field crews were unable to gain full access to the sites to closely evaluate the storm drainage and other site characteristics.

Table 2-6. Hotspot Site Investigation Summary

Location	Address or Cross Streets	Subwatershed	Land Use
Filley Pond Plaza	Tunxis Ave (Rt 189), north of Park Ave	Wash Brook South (WBS)	Commercial
Bloomfield Town Garage	21 Southwood Drive	Blue Hills Reservoir (BHR)	Transportation-related
Used Equipment Lot	Southwood Road	Blue Hills Reservoir (BHR)	Industrial
Copaco Shopping Center	Cottage Grove Road (Rt 218) & Granby Street	North Branch Park River (NBP)	Commercial
OSAI-USA Business Park	Dudley Town Road	Winton bury Reservoir (WTB)	Industrial
University of Hartford - University Commons	Bloomfield Avenue & Hawk Drive	North Branch Park River (NBP)	Institutional (Education)
Cigna, Metlife, and County Club	Hall Blvd & Cottage Grove (Rt. 218 corner)	Tumbledown Brook (TDB)	Industrial
Bloomfield Town Hall	800 Bloomfield Ave	Wash Brook South (WBS)	Community/Municipal

Filley Pond Plaza

The Filley Pond Plaza is located along Tunxis Road in Bloomfield within the Wash Brook South subwatershed. The commercial shopping plaza consists of a supermarket and several other retail stores. The shopping plaza is registered under the Connecticut Department of Environmental Protection *General Permit for the Discharge of Stormwater Associated with Commercial Activity*.



Runoff from garbage dumpster area drains to nearby catch basin



The parking lot pavement is breaking up and stained and sediment and debris have collected in some areas.

The shopping plaza parking lot is estimated to be approximately 15 years old. The pavement is in poor condition, with areas of broken pavement and significant oil staining. The storage of outdoors materials and loading operations could be improved to reduce the potential for stormwater pollution from the site. Each retail store appears to rent its own dumpster, and some dumpsters were not properly covered, many are located near a catch basin, and staining on the ground was observed around the dumpsters. Materials were stored outdoors without cover including bins, crates, packing materials, and various other items. The conditions and practices observed at this shopping plaza are typical of those at similar commercial shopping

plazas in the watershed, which highlights the need for improved outreach and pollution prevention to address stormwater impacts from commercial areas.

Bloomfield Town Garage

The Bloomfield Town Maintenance Garage and administrative offices are located on Southwood Road in Bloomfield. The facility is located in the Blue Hills Reservoir subwatershed adjacent to a headwaters tributary to Beaman Brook. The facility is registered under the Connecticut Department of Environmental Protection *General Permit for the Discharge of Stormwater Associated with Industrial Activity*.

Fleet vehicles are stored, maintained, fueled and repaired at this location. An uncovered fueling station is located on-site. Loading and unloading of various materials occurs at this site, including sand and gravel. Three dumpsters and one roll-off for garbage were present at the facility, which were covered and in good condition.

Access could not be obtained to the rear of the facility during this site visit. It is recommended that a follow-up inspection be performed at this site to determine the connectivity of the storm drainage system on the site. The facility is located adjacent to a tributary of Beaman Brook and is a potential candidate for a stormwater treatment retrofit.

Southwood Road – Used Equipment Storage Lot

A property on Southwood Road of unknown ownership is located between the Mather Corporation parcel and the volunteer fire department building. The property is being used as machine and used equipment storage lot. The ownership of the property is unclear from the Bloomfield Assessors database since the address is unknown. Field crews could not gain access to the site for inspection, although used machinery, tires, roll-off dumpsters, loading trucks, and machine and truck parts were observed to be scattered throughout the site. The equipment and machinery is a potential stormwater pollutant source, and the site is located near a tributary of Beaman Brook. A follow-up evaluation of this site is recommended to confirm property ownership and further evaluate the site for pollution potential.



Copaco Shopping Center

The Copaco Shopping Center is a large retail shopping plaza located on Cottage Grove Road (Route 218), with anchor stores that include a home improvement center and supermarket. The shopping center is located in the North Branch Park River subwatershed. Potential stormwater pollution sources at this location include:

- Loading operations – Loading docks are positioned over drainage catch basins. Idling trucks may leak oil or other vehicle fluids that can discharge directly to the stormwater drainage system.
- Outdoor materials storage – The shopping center maintains outdoor sand and salt storage piles. The salt pile and one of the sand piles were covered, but a larger sand pile was not covered at the time of the evaluation. A catch basin is located nearby, although no evidence of material migration to the stormwater system was observed.
- Waste Management – Several dumpsters in the rear of the retail shops had no covers and were overflowing with garbage. The dumpsters are also located near catch basins.



An uncovered dumpsters near a catch basin.



Truck loading/unloading operations at this dock occur over a stormwater catch basin, increasing the potential for oil and spills to enter the system.

Similar to the Filley Pond Plaza, the conditions and practices observed at the Copaco Shopping Center are typical of those at commercial shopping areas throughout in the watershed, which highlights the need for improved outreach and pollution prevention to address stormwater impacts from commercial areas.

Stormwater treatment practices are present on the site. A recently constructed stormwater basin receives runoff from the Lowe's parking area and potentially other areas of the site. The condition of the basin could not be closely assessed in the field since access is limited by a perimeter fence. However, a dense stand of cattails were present surrounding the fringe of the basin, and evidence of deeper water appeared to be present toward the center.

OSAI-USA Business Park on West Dudley Town Road

Various manufacturing and industrial facilities housed in individual and shared building suites are located along West Dudley Town Road. A manufacturing facility at 105 West Dudley Town

Road was chosen as a representative facility for assessment. Similar to other facilities in this area, the operations are almost entirely contained indoors and include activities related to elevator manufacturing, flooring, construction contractors, machining, and others. The rear of the facility was observed to contain two dumpsters which were in good condition and an uncovered soil or road sand stockpile. This and other similar facilities along West Dudley Town Road appear to have low pollution potential and are not recommended for future evaluation.

University Commons at University of Hartford

The North Branch Park River flows west to east through the center of the University of Hartford campus and then flows southerly along the eastern campus boundary. The University Commons, one of the campus buildings that contains student services, a restaurant, dining hall and offices, is located in the center of campus adjacent to the river. Dumpsters located behind the building were covered and the surrounding ground surface was generally clean and free of staining and is not likely to be a source of stormwater pollution. Leaf litter was observed in much of this area.

Cigna Campus

The Cigna Campus is a 304-acre parcel including Cigna, Metlife and Gillette Ridge Golf course offices. The eastern portion of the property also contains part of the Gillette Ridge Golf Course. Based on GIS mapping, there is approximately 60 acres of impervious area on the parcel, for approximately 20% overall imperviousness. Facility trash and other wastes are primarily stored and managed indoors or under covered overhangs, such as a loading dock in the rear of the Cigna building. Stormwater controls are present on the site. A parking garage associated with the Cigna building appears to drain to a constructed wetland along Hall Boulevard.



Bloomfield Town Hall

The Bloomfield Town Hall is located on Park Avenue in Bloomfield Center in the Wash Brook South subwatershed. The Town Hall is an administrative building with staff parking and no storage of fleet vehicles or on-site industrial activities. Although the pollution potential of this site is low, it is a good candidate for a demonstration stormwater retrofit project on a high-profile municipal site. The site is highly visible since it is a municipal building located at a main intersection in the Bloomfield town center. There are many stormwater retrofit opportunities at this site at locations where stormwater is currently directed toward catch basins in grassed areas or low areas downgradient of the parking lot. Additionally, there is adequate open space on the property to implement on-site retrofits such as rain gardens, vegetated swales or bioretention to treat runoff from the roof or parking areas.



2.5 Streets and Storm Drain Assessment

Urban streets and storm drains can be a source of stormwater pollutants if not maintained on a regular basis. The condition of the local road and storm drain infrastructure can be evaluated to assess the effectiveness of existing maintenance practices for reducing pollutant accumulation. Selected streets and storm drains were assessed during the upland field inventories conducted on November 19, 2009. Most of the streets and storm drains that were assessed are located in or near hotspot or neighborhood source assessment locations. Findings of the street and storm drain assessment are summarized below. Photographs of the storm drains and the street conditions evaluated are provided as *Figure 2-4*.

The majority of the storm drains observed during the field assessments were not stenciled to indicate their discharge point. All areas of the watershed could benefit from storm drain stenciling and similar watershed stewardship signage, particularly for drainage systems that discharge directly to the North Branch Park River or its tributaries.

Copaco Shopping Center

The streets and storm drains in the rear of the Copaco Shopping Center along Route 218 in Bloomfield were found to be in good condition with clear catch basin inlets, no litter, organic debris, or sediment accumulation surrounding or within the catch basins. Most of the catch basins observed included sumps, and sediment levels in the sumps were generally at least 1.5 feet below the pipe invert, suggesting that they are cleaned regularly. A slight oil sheen was observed on the surface of the standing water in many of the catch basins. Approximately half of the pavement in the parking lot and loading dock areas behind the shopping center is in

poor condition, with numerous cracks and broken areas. More frequent street sweeping and storm drain stenciling are recommended.

Woodside Village

The streets and catch basin inlets evaluated in Woodside Village on Dorothy Drive were free from sediment, debris and blockages. However, the catch basin sumps were observed to be full of sediment and have significant leaf buildup and organics accumulation. Increased catch basin clean-out and street sweeping is recommended, and the town should consider stenciling the more visible catch basins as a public education measure.

University of Connecticut Law School Lot D

Lot D at the University of Connecticut Law School is adjacent to the North Branch Park River. The parking lot pavement is in poor condition, with many cracks and depressions. Portions of the lot consist of unpaved, compacted dirt areas. Accumulations of litter and organic debris were observed on the grates of the catch basins. Field crews were unable to assess the depth of sediment accumulation in the catch basin sumps. Increased street sweeping and catch basin clean-out is recommended.

Mills Pond Townhouses

The streets and storm drains in Mills Pond were observed to be clean and generally free of sediment, organic matter or staining. Field crews were unable to determine the level of sediment buildup in the catch basin sumps.



Location	Storm Drains		Streets
Copaco Shopping Center			
Woodside Village			
University of Connecticut Law School Lot D			
Mills Pond			

Figure 2-4. Streets and Storm Drain Assessment Photographs



3 References

Fuss & O'Neill, Inc, (2009). Baseline Watershed Assessment: North Branch Park River Watershed. Connecticut Department of Environmental Protection.

Kitchell, A. and T. Schueler. (2005). Urban Subwatershed Restoration Manual No. 10: Unified Stream Assessment: A User's Manual (Version 2.0). Center for Watershed Protection.

Wright, T., Swann, C., Capiella, K. and T. Schueler. (2005). Urban Subwatershed Restoration Manual No. 11: Unified Subwatershed and Site Reconnaissance: A User's Manual (Version 2.0) Center for Watershed Protection.



Appendix A

Field Inventory Subwatershed Maps



Appendix B

Stream Corridor Assessment Field Data Forms



Appendix C

Upland Assessment Field Data Forms



Appendix D

Photographs on CD

