

## Field Findings Report

**Date:** March 16, 2012

**Subject:** Pollution Source Reduction in Baltimore Watersheds

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Field staff prepare to take a water sample from the Harris Creek outfall located at Boston Street in Canton.

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## **Acknowledgments**

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## **Project Background**

In the summer and fall, 2011, the Center for Watershed Protection (Center) worked with Blue Water Baltimore (BWB) and neighborhood leaders to identify sources of pollution within the Harris Creek Watershed (also known as Watershed 246). The primary goal of this project is to reduce trash, nutrients (nitrogen and phosphorus), sediments, metals and bacteria that impair the Baltimore Harbor by detecting and eliminating sources of pollution. The Center also worked with the Baltimore City Department of Public Works to systematically detect and eliminate nonstormwater or illicit discharges within the storm drain network.

The Harris Creek Watershed, located in southeast Baltimore, is approximately two square miles (1,271 acres) and encompasses 23 neighborhoods and three parks (Clifton Park, Bocek, and Patterson Park). Figure 1 provides a map of the Harris Creek watershed. The watershed drains directly to the Baltimore Harbor near the waterwheel off Boston Street in the Canton neighborhood.

In 2010, the Center and BWB developed the Harris Creek Small Watershed Action Plan that outlines a series of recommendations for watershed restoration, describes implementation strategies, and identifies priority projects. This project provides action to several of the key recommendations from the Harris Creek Watershed Plan. Methods for the various assessments used in this project can be found in Appendix A.

Follow-up pollution reduction strategies identified during the project include cleaning up sites with trash dumping, cleaning-out clogged catch basins, identifying potential hotspot sites for future follow-up on-site inspections, and repairing illicit discharges (Figure 2). In addition to reporting these findings to the Department of Public Works, the Center submitted the locations for trash clean-up, catch basin cleanout and erosion and sediment control to the Baltimore City 311 Service Request program.



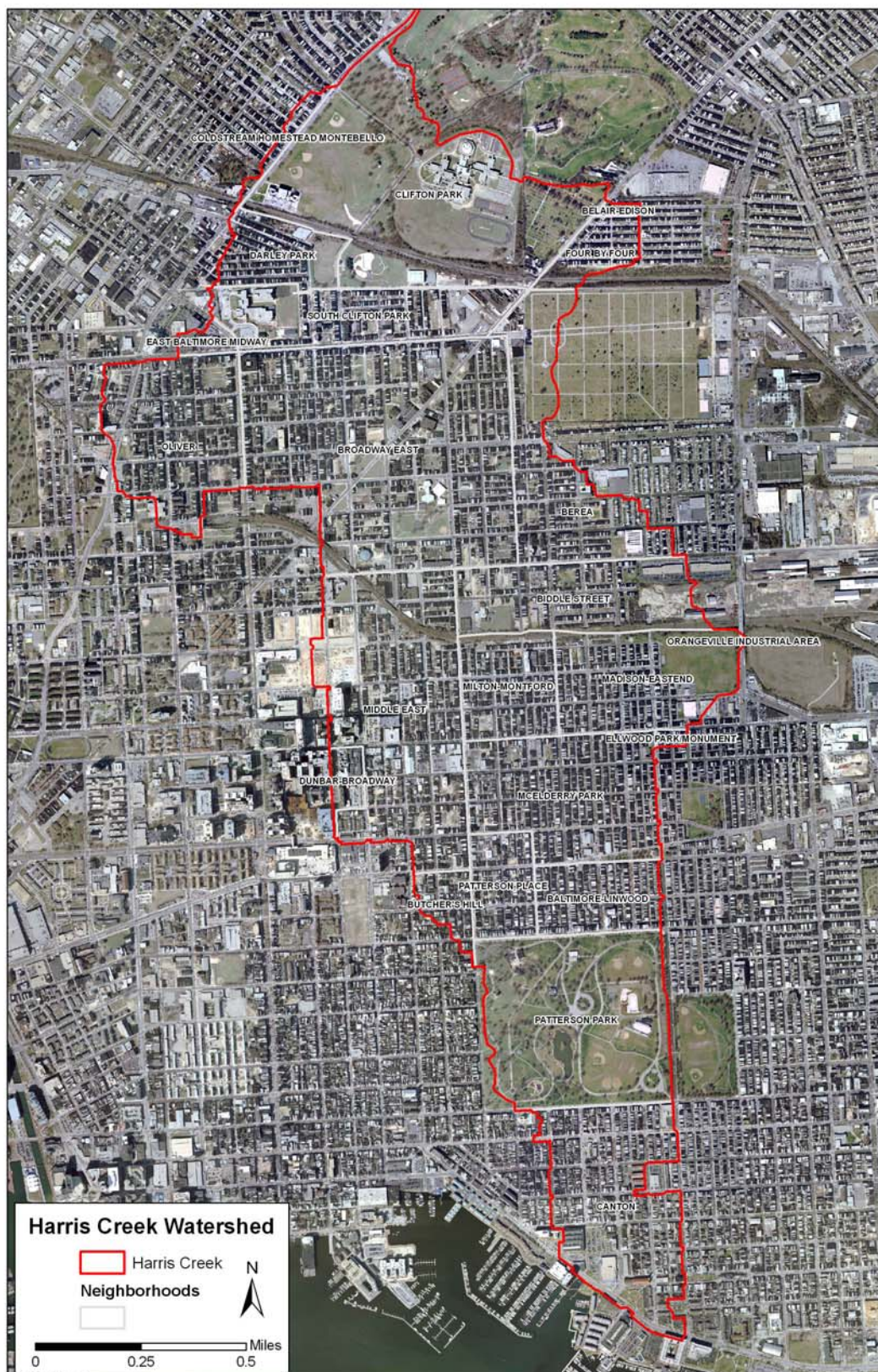


Figure 1. Harris Creek watershed in Baltimore, Maryland.





**Figure 2. Representative field photos. Illegal trash dumping sites (top left and right), potential hotspot facilities (middle left), clogged stormdrain inlet (middle right), illicit discharge sampling (both bottom photos).**



## Findings

Ninety-five pollution sources and thirty-three community greening opportunities were identified in the Harris Creek watershed through the upland assessment and illicit discharge screening. The majority of the sources were detected in the middle portion of the watershed (Figure 3). These are described in further detail below and in the Pollution Reduction Strategies section.

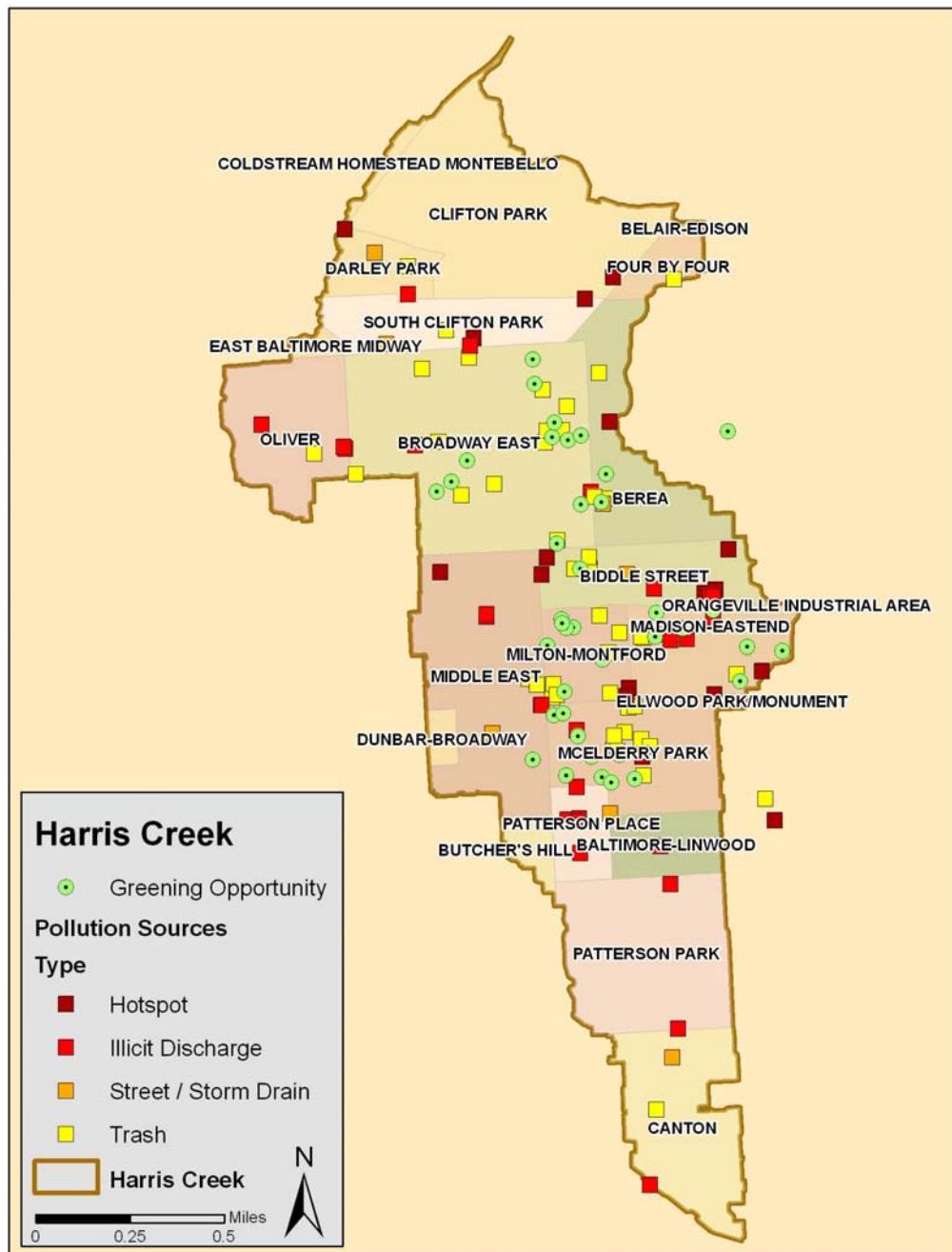


Figure 3. Pollution sources and greening opportunities in the Harris Creek watershed.

### Upland Pollution Sources

Pollution sources on land were identified in the Harris Creek watershed and included the following: 1) forty eight trash dumping sites in alleys, vacant lots, and on streets; 2) nine clogged catch basin inlets; and 4) eighteen potential hotspots and one confirmed hotspot. Sites were reported to 311 and the follow up actions were tracked. About half of the sites visited in Round 1 field work (6/20/11) were re-visited to determine if any action had been taken as a result of reporting to Baltimore City's 311 Service Request (311). Of the 13 sites that were re-visited, six still were dumping sites for trash and seven did not have any trash. One confirmed hotspot was a construction erosion and sediment control violation that was reported to authorities and when revisited found to have controls in place. Six additional sites were re-visited on 12/21/2011 and five of these were found to still have significant trash and were reported again to 311.

Hotspots were identified in the watershed and consisted mainly of auto body shops. These sites were largely unsafe for field surveys and were therefore only assessed using a drive-by assessment. More detailed assessments of these sites by City of Baltimore staff are recommended.

Trash and debris in streets and storm drains was identified as both a problem and prevalent in the watershed. Trash dumping, especially in vacant lots, was documented throughout the Harris Creek watershed. Improper trash disposal was identified and included trash cans with no lids, trash bags not in trash cans, and public trash receptacles that exceeded their capacity. Several pollution factors are associated with trash, including rats, nutrients, and bacteria. See Appendix B for details on the hotspot, trash and debris, and street and storm drain assessment data.

Community opportunities and retrofit reconnaissance identified several community leaders and potential future partners to move community "greening and cleaning" efforts forward to implementation. Thirty three greening opportunities were identified in the five neighborhoods surveyed on 8/23/11, 9/8/11, and 12/21/11. Neighborhoods assessed included McElderry Park, Biddle Street, Madison East End, Milton-Montford, Broadway East, and Berea neighborhoods. The community opportunities and retrofit projects identified included: 1) seventeen bioretentions; 2) three street tree plantings; 3) one rain water harvesting application, 4) one porous pavement site; 5) four community spaces; and 6) five "others" that included a water park, a site to be determined based on school input, a tree and/or community park, and two sites with options for tree planting and/or bioretention. See

[illegible]

### Illicit Discharge Sources

6

of the Bocek Playfield (Figure 5). One transitory discharge was observed at Eager-Ashland and North Lakewood where a homeowner was washing down his lot. Another discharge, H2-2, was determined to be coming from a semi-permanent car wash station set up on Patterson Park Ave (Figure 6). This resulted in a discharge that was detected in a manhole at Chester and Eager. See Appendix E for the Harris Creek illicit discharges data.

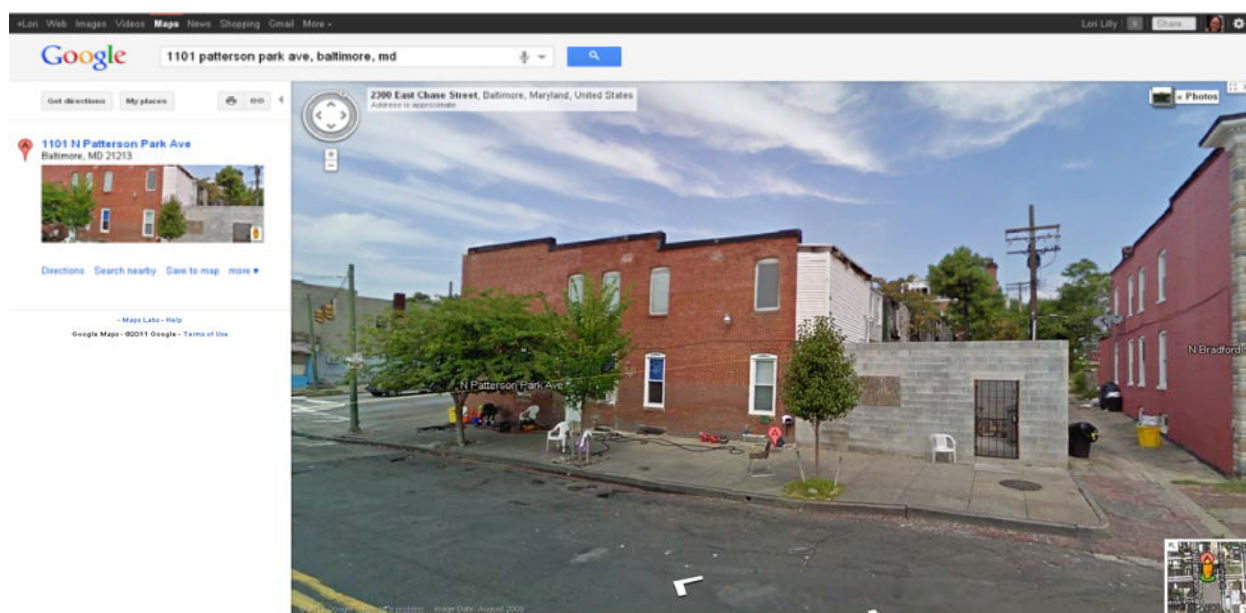
A memo containing findings from the initial round of field work by the Center was sent to the City of Baltimore Surface Water Management Division on 8/16/2011 along with geographic location information. The City reported back on follow-up work to isolate the sources at several locations and worked with Center staff to screen additional sites on 11/1-11/3, including some sites that were inaccessible during the initial screening in August. Results of some of the City of Baltimore's investigations include:

- Site H5-1 at Ashland and North Belnord: Confirmed a sanitary discharge of unknown origin (SDUO) by the City;
- K2-1 at Fairmont and Montford: City was investigating up the pipe and working to isolate the source;
- G4-1 at Lakewood and Beryl: City tracked to a sanitary line in the 1100 block of Milton Avenue and is turning over to Wastewater Engineering;
- H6-2B at the Recycling Plant: City to bring in Pollution Control and notify Maryland Department of Environment (MDE);
- F4-2 at Federal and Wolfe: City found a broken water valve in the 1900 block of E. Federal Street;
- H2-2 at Chester and Eager: City tracked to resident at 1101 Patterson Park Avenue conducting car wash business from home; and
- J4-2 at Montford and Orleans: Problem tracked to water main break at 2311 Orleans Street





**Figure 5. Water collecting in a back corner of the recycling plant (left), drains off-site through a cell phone tower facility (middle), and exceeds industrial and sewage benchmark values based on water quality testing (right).**




**Figure 6. Semi-permanent car wash station at 1101 Patterson Park Ave is visible from Google Maps. Washwater from the car wash leaves the site untreated and enters the stormdrain system. The discharge was detected from excessive detergent concentrations found in a manhole three blocks away. Image from Google Maps.**



## Pollution Reduction Strategies

Select trash sites identified as more severe upland pollution source sites are described here. Included within each site write-up is a brief description of the problem and potential follow-up actions to address the issues. All sites were reported to the City via 311 and City response to the reports was tracked. Nineteen of the reported sites were re-visited and 11 were found to still have significant trash, eight were cleaned up, and five severe sites were reported again to 311. One confirmed hotspot was a construction erosion and sediment control violation that was reported to authorities and when revisited found to have controls in place. An overall conclusion drawn from tracking 311 reporting is that the system is insufficient for addressing the majority of the trash hotspots. The community would benefit from a short training on proper input of reporting problems through the system in order to maximize clean-up efforts.

<p>Site ID: HC-TR-232 (alternative ID: HC-TR-B-502)          Neighborhood: McElderry Park, N. Rose/N. Luzerne Alley and McElderry Street          Site visits: 6/20/11 and 8/23/11</p>	
<p><u>Problem</u> Legacy dumping site behind house and in alley (trash present both times), potential hazardous wastes, rats, evidence of trash encourages others to dispose of trash in this area</p> <p><u>Follow Up</u> 311 results for 6/20/11 were: 1) Housing Code Enforcement Official referred to another agency and 2) closed as of 6/22/11. The Center site visit on 8/23/11 found site was not cleaned up. 311 results for 8/23/11 were: 1) HCD-Illegal Dumping---Alley and 2) closed 9/15/11.</p>	
<p><u>Pollution Reduction Strategies</u></p> <ul style="list-style-type: none"> <li>• Education for bulk trash pick up, education for trash program, education for recycling program City to contact owner for action(s)</li> <li>• City to contact owner for action(s)</li> <li>• Neighborhood Watch</li> <li>• Volunteer clean-up</li> <li>• City clean-up</li> <li>• Neighborhood group continue to report to 311 and track investigation until resolved</li> <li>• Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting)</li> </ul>	

Site ID: HC-TR-312

Neighborhood: Broadway East

N. Lafayette between N. Chapel Street and Wolfe/Chapel Alley

Site visit: 6/20/2011

Problem Two dumping sites behind houses and in alleys, both household and construction dumping, potential hazardous wastes, and rats



Follow Up 311 results were: 1) dispatched investigator and 2) unfounded.

Pollution Reduction Strategies

- Education for bulk trash pick up, education for trash program, education for recycling program
- City to contact owner for action(s)
- Neighborhood Watch
- Volunteer clean-up
- City clean-up
- Neighborhood group continue to report to 311 and track investigation until resolved
- 311 Service Type could include: "Dirty Alley Cleaning," "Housing Inspection - Trash and/or Weeds," or "Housing Inspection – Rodent"
- Remove weeds and shrubs
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-TR-322

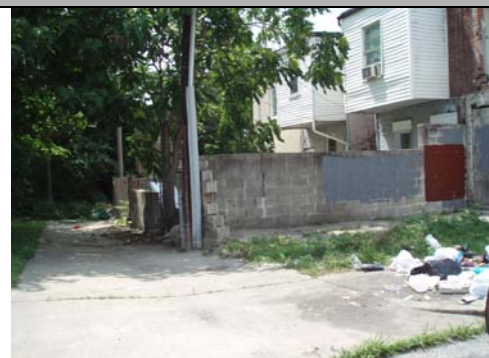
Neighborhood: Broadway East

Lafayette/Lanvale Alley and N. Bradford Street

Site visit: 6/20/11

Problem Legacy dumping site behind house in back yard and in alleys nearby, potential hazardous wastes, and rats

Follow Up 311 results for 6/20/11 were: 1) Referred for removal and 2) cleaned. The Center site visit on 8/23/11 found the site had trash again.



Pollution Reduction Strategies

- Education for trash program and education for recycling program

Site ID: HC-TR-322

Neighborhood: Broadway East

Lafayette/Lanvale Alley and N. Bradford Street

Site visit: 6/20/11

- City to contact owner for action(s)
- Neighborhood watch
- Volunteer clean-up
- City clean-up
- Remove weeds and shrubs
- Neighborhood group continue to report to 311 and track investigation until resolved
- 311 Service Type could include: "Dirty Alley Cleaning," "Housing Inspection - Trash and/or Weeds," or "Housing Inspection – Rodent"
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-TR-B-503

Neighborhood: McElderry Park

Alley of 500 Glover that includes 500, 506, 508, 510, 523, 537 N. Luzerne

Site visit: 8/23/11

Problem Legacy household trash dumping site behind 4 to 6 houses and in alleys, potential hazardous wastes, rats, and Code Enforcement Official acknowledged that 500 block of Glover was a problem area during field site visit.

Follow Up Reported to Code Enforcement Official onsite 8/23/11. 311 results were:  
1) HCD-Illegal Dumping and  
2) closed 9/15/11.

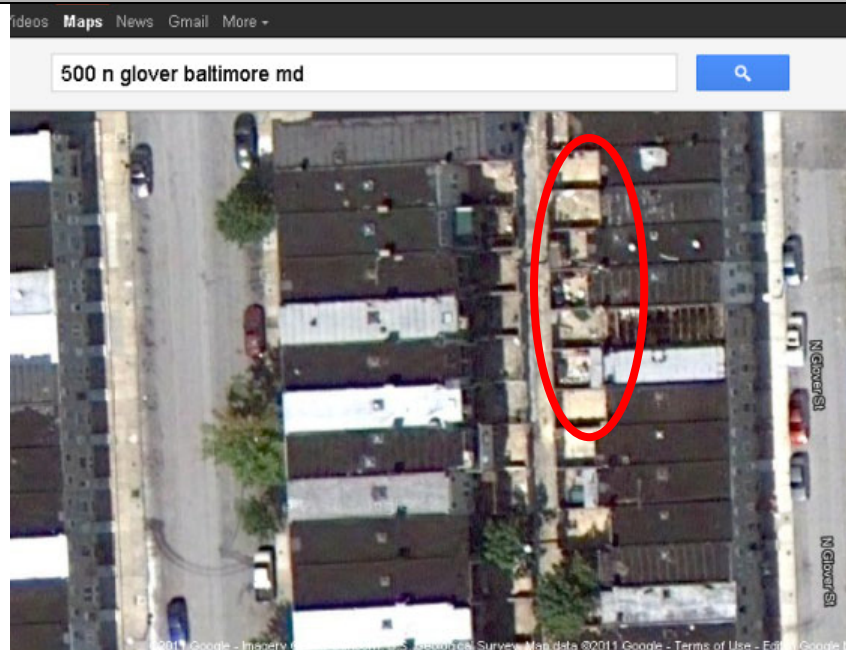


Site ID: HC-TR-B-503

Neighborhood: McElderry Park

Alley of 500 Glover that includes 500, 506, 508, 510, 523, 537 N. Luzerne

Site visit: 8/23/11



Google Map shows back yards with trash from aerials. Retrieved 10/19/11.

#### Pollution Reduction Strategies

- Education for trash program and education for recycling program
- City to contact owners for action(s)
- Neighborhood watch
- City clean-up
- Volunteer clean-up
- Remove weeds and shrubs
- Neighborhood group continue to report to 311 and track investigation until resolved
- 311 Service Type could include: "Dirty Alley Cleaning," "Housing Inspection - Trash and/or Weeds," or "Housing Inspection – Rodent"
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)



Site ID: HC-TR-B-510

Neighborhood: Milton-Montford

Vacant lot behind 822 N. Milton Avenue

Site visit: 8/23/11

Problem Trash dumping and improper trash disposal (no lid on can) at site behind house and in alley, potential hazardous wastes, rats, residents report that they want area cleaned and want other residents to dispose of trash properly.

Follow Up 311 results for 8/23/11 were: 1) HCD-Sanitation Occupied Private Property and 2) closed 9/14/11.



Pollution Reduction Strategies

- Education for trash program and education for recycling program
- City to contact owners for action(s)
- Neighborhood watch
- City clean-up
- Volunteer clean-up
- Remove weeds and shrubs
- Neighborhood group continue to report to 311 and track investigation until resolved
- 311 Service Type could include: "Trash Can/Recycling Container Complaint," "Dirty Alley Cleaning," "Housing Inspection - Trash and/or Weeds," or "Housing Inspection – Rodent"
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)



Site ID: HC-TR-B-513

Neighborhood: McElderry Park

Vacant lot behind 2500 McElderry Street in an alley named McElderry Allen Jefferson

Site visit: 8/23/11

Problem Legacy dumping site behind house and in alley, potential hazardous wastes, rats, evidence of people staying in area.



Follow Up 311 results for 8/23/11 were : 1)HCD-Sanitation Occupied Private Property and 2) closed 9/14/11.

Pollution Reduction Strategies

- Education for trash program and education for recycling program
- City to contact owner for action(s)
- Remove trees and shrubs from back yard
- Neighborhood Watch
- Volunteer clean-up
- City clean-up
- Remove weeds and shrubs
- Neighborhood group continue to report to 311 and track investigation until resolved
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-TR-B-604

Neighborhood: Madison East End

2726 to 2730 Ashland Avenue

Site visit 9/8/11

Problem Legacy dumping sites behind houses and in alley, potential hazardous wastes, several rats observed during site visit, and residents report eyesore and health hazard.



Follow Up 311 results were: 1) Forestry Down Tree and 2) open.

Pollution Reduction Strategies

- Education for trash program and education for recycling program
- City to contact owner for action(s)
- Neighborhood Watch
- Volunteer clean-up
- City clean-up

Site ID: HC-TR-B-604

Neighborhood: Madison East End

2726 to 2730 Ashland Avenue

Site visit 9/8/11

- Neighborhood group continue to report to 311 and track investigation until resolved
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-TR-605

Neighborhood: Madison East End

905 N. Belnord Avenue

Site visit 9/8/11

Problem Two dumping sites behind houses and in alleys, both household and construction dumping, potential hazardous wastes, rats, residents report eyesore and health hazard.

Follow Up 311 results were: 1) HCD-Illegal Dumping and 2) closed 9/15/11



Pollution Reduction Strategies

- Education for trash program and education for recycling program
- City to contact owner for action(s)
- Neighborhood Watch
- Volunteer clean-up
- City of Baltimore clean-up
- Neighborhood group continue to report to 311 and track investigation until resolved
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-TR-B-606

Neighborhood: Milton-Montford

701 N. Rose Luzerne

Site visit 9/8/11

Problem Legacy household trash dumping site behind houses, potential hazardous wastes, and rats.

Follow Up 311 results were: 1) HCD-Illegal Dumping and 2) closed 9/15/11.



Site ID: HC-TR-B-606

Neighborhood: Milton-Montford

701 N. Rose Luzerne

Site visit 9/8/11

Pollution Reduction Strategies

- Education for trash program and education for recycling program
- Neighborhood watch
- Volunteer clean-up
- City clean-up
- Neighborhood group continue to report to 311 and track investigation until resolved
- Future strategies needed to deter continued dumping in the area (e.g., signs, surveillance camera, physical barrier(s), lighting, etc.)

Site ID: HC-HSI-207

Neighborhood: Biddle Street

Biddle & Patterson Park/SE corner

Site visit: 6/20/2011

Problem Erosion and sediment control needed at construction site.

Follow Up Reported to the City for enforcement on 6/20/11. Al Barnes from Baltimore City (410-396-4190) inspected the site and silt fences were installed (7/25/11). Al Barnes will continue to follow-up. The Center revisited on 8/23/11 and generally acceptable, but some areas of silt fence should be repaired.



Pollution Reduction Strategies

- Follow erosion and sediment control policies in place
- Neighborhood group continue to report to 311 and track investigation if problem persists
- Reinspect as needed

## Community Greening Projects





Potential stormwater, community greening, and community enhancement opportunities were assessed for Madison East End, Biddle Street, McElderry Park, Milton-Montford, and Broadway East. In addition to the water quality benefits that these projects provide, they can also provide other benefits to the community such as beautification, noise reduction, air purification, and generating a sense of ownership and stewardship for local residents. A sense of ownership for neighborhood greening projects will help to ensure long-term success as well as continued implementation of greening projects into the future.

The location, opportunity, and group to take the lead in implementation for proposed community greening projects are provided in Appendix B Table 2. Each site visited has an associated field form, photos, preliminary sketch, contributing drainage area, and potential next steps with the group(s) that could take the lead. Example bioretention, rainwater harvesting, pervious pavement, and street tree opportunities are provided in Table 1. The next steps for implementation involve: 1) taking these ideas to the community and determining which projects should be implemented; 2) involving the necessary groups to move toward implementation; 3) finding funding sources; and 4) planning and implementing the project(s).

Thirty nine community greening opportunities were identified in the Harris Creek watershed, including bioretention, rain garden, sub-soiling or deep tilling, rainwater harvesting, impervious cover removal and tree planting. A bioretention or the smaller version, the rain garden, is a landscaping feature adapted to treat stormwater runoff at retrofit sites. Individual bioretention areas serve drainage areas of one acre or less. Surface runoff is directed into a shallow landscaped depression that incorporates many of the pollutant removal mechanisms that operate in forested ecosystems (Schueler et al., 2007). Rainwater harvesting can be accomplished using downspouts that are connected to a receptacle such as a 50 gallon drum. This water can be reused after the storm event(s) and does not enter the storm drain system during the rain event(s). Tree planting reduces the volume of stormwater runoff and decreases the pollution associated with that runoff (e.g., nitrogen, phosphorus, and bacteria). In addition, trees provide several additional community benefits that include beautification, air improvements, noise reductions, and city heat island reduction (Center for Watershed Protection, 2011). Additional opportunities identified include community gardens, a water park at Bocek Park, and porous pavement or pervious pavers.







Future work will focus on community based projects that meet the triple bottom line for people, prosperity, and planet. Currently, projects identified in the Harris Creek Small Watershed Action Plan are underway. For example, tree plantings in McElderry Park and designs for a cul-de-sac improvement near Fayette and Potomac Streets. There are opportunities to restore vacant lots to provide neighborhood amenities and/or stormwater management benefits. In addition, linking existing and future greening and cleaning efforts geographically are project goals. Neighborhood greening plans that link multiple types of projects and incorporate green streets, pedestrian and bicycle friendly corridors, shopping hubs, and other community amenities is recommended. See Appendix F for three potential Harris Creek watershed neighborhood greening plans. The Center, BWB, the City of Baltimore, and additional project collaborators continue to refine these results to improve the community benefits in the Harris Creek watershed.

**Table 1. Potential community greening opportunities in the Harris Creek watershed.**

Location	Site Photo	Opportunity Identified	Representative Opportunity Photograph
915 N. Montford Avenue		Bioretention	 Rain garden in parking lot in Portsmouth, VA.
Jefferson Street & intersections of N. Madera, N. Port, N. Rose, & N. Glover		Roundabout with bioretention	 Green street with bioretention in New York City. Photo Credit: Nandan Shetty.



**Table 1. Potential community greening opportunities in the Harris Creek watershed.**

Location	Site Photo	Opportunity Identified	Representative Opportunity Photograph
408/412 N. Milton Avenue		Rainwater Harvesting	 <p>Rainwater harvesting in New York City. Photo credit: Tatiana Morin.</p>
Bocek Park		Rain Garden or Bioretention	 <p>Installation of a rain garden at a high school in Port Tobacco, Maryland.</p>
901 block of N. Kenwood Avenue (east and west side of block)		Tree planting on the block	 <p>Street trees in Library Square (Harris Creek watershed, Baltimore City).</p>

## References

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## **Appendix A. Field methods.**

Following up on actions identified in the Harris Creek Small Watershed Action Plan (Center for Watershed Protection, 2010), The Center completed upland assessments and illicit discharge screening in the Harris Creek watershed. Upland assessments are effective at identifying potential sources of transitory pollution into local waterways, that is, singular events such as dumping and spills. Transitory pollution sources typically occur on the landscape and often are directly related to behavior. Other sources of pollution occur through leaks and breaks within a City's infrastructure. These intermittent or continuous sources of pollution are often the result of a mixture between stormwater and wastewater directly through illicit connections or indirectly through infiltration of sanitary water into the storm drain system through leaks and cracks. A systematic process of sampling within the storm drain network can be used to detect this type of pollution, which is otherwise known as an illicit discharge.

### ***Upland Assessments***

Field teams and volunteers from the Harris Creek community and Blue Water Baltimore performed an upland assessment of pollution sources on June 20, 2011. The first round of field work focused on identifying problem areas using investigations for Hotspots, Trash sites, and problem Streets and Storm Drains. Based on these findings, past data efforts and reports, five neighborhoods were identified as priority areas for potential pollution reduction. A second round of field work was conducted in Broadway East, Milton-Montford, McElderry Park, Biddle Street, and Madison East End. The second round of field work included the assessments made in the first round as well as stormwater retrofit investigations. The second round of field work was conducted on August 23, 2011, for Broadway East, Milton-Montford, McElderry Park, and Biddle Street and September 8, 2011 for Madison East End. Prior to field work a database of 30+ Harris Creek community leaders were contacted for site specific pollution areas in their neighborhood. These Harris Creek community members were also invited to participate in field work. Coordinating with the community members and leaders helps improve the quality of the findings since those living in the neighborhoods know the area the best and also communicates the efforts throughout the neighborhoods to improve public knowledge and information for these efforts.

Field work consisted of gathering site specific information using field forms, taking photos, reporting violations (if applicable), compiling the information in a database, and interpreting major pollution

prevention themes based on the collected data. Field work investigation descriptions are included in the following sections.

### **Hotspot Site Investigations (HSI)**

Pollution source control includes the management of potential “hotspots,” which are certain commercial, industrial, institutional, municipal, and transport-related operations in the watershed. These hotspots tend to produce higher concentrations of polluted stormwater runoff than other land uses and also have a higher risk for spills. They include auto repair shops, department of public works yards, restaurants, etc. Specific on-site operations and maintenance combined with pollution prevention practices can significantly reduce the occurrence of “hotspot” pollution problems.

The Hotspot Site Investigation or HSI is used to evaluate commercial, industrial, municipal or transport-related sites that have a high potential to contribute contaminated runoff to the storm drain system or directly to receiving waters. At hotspot sites, field crews look specifically at vehicle operations, outdoor materials storage, waste management, building conditions, turf and landscaping, and stormwater infrastructure to evaluate potential pollution sources (Appendix Table 1). Based on observations at the site, field crews may recommend enforcement measures, follow-up inspections, illicit discharge investigations, retrofits, or pollution prevention control and education.

The overall pollution prevention potential for each hotspot site is assessed based on observed sources of pollution and the potential of the site to generate pollutants that would likely enter the storm drain network. A hotspot designation criterion set forth in Wright et al. (2005) was used to determine the status of each site based on field crew observations. Sites are classified into four initial hotspot status categories:

- Not a hotspot – no observed pollutant; few to no potential sources
- Potential hotspot – no observed pollution; some potential sources present
- Confirmed hotspot – pollution observed; many potential sources
- Severe hotspot – multiple polluting activities directly observed

<b>Appendix A Table 1. Potential Hotspot Pollution Sources.</b>		
<b>Type</b>	<b>Description</b>	<b>Examples</b>
Vehicle Operations	Routine vehicle maintenance and storage practices, as well as vehicle fueling and washing operations	<ul style="list-style-type: none"> <li>• Vehicle storage and repair</li> <li>• Fueling areas</li> <li>• Vehicle washing practices</li> </ul>
Outdoor Materials	Exposure of outdoor materials stored at the site	<ul style="list-style-type: none"> <li>• Loading and unloading</li> <li>• Outdoor materials</li> <li>• Secondary containment</li> </ul>
Waste Management	Housekeeping practices for waste materials generated at the site	<ul style="list-style-type: none"> <li>• Dumpster practices</li> </ul>
Stormwater Infrastructure	Practices used to convey or treat stormwater, including the curb and gutter, catch basins, and any stormwater treatment practices	<ul style="list-style-type: none"> <li>• Catch basins</li> <li>• Stormwater treatment practices</li> </ul>

### **Trash and Debris (TR)**

The Trash and Debris assessment or TR identifies trash and debris sites, what types of materials are present, and the potential restoration and clean-up potential available at the site. During the Harris Creek field work, trash was identified as a high priority pollutant due to the prevalence in earlier studies and association with pollutants (i.e., nitrogen, phosphorus, and bacteria). Trash sites that were greater than or equal to five bags of trash were documented using TR field forms, photos were taken, and sites were reported to the City of Baltimore using the 311 system. For detailed information about the TR, refer to Wright et al., 2005.

### **Streets and Storm Drains (SSD)**

Urban streets and storm drains can accumulate and store urban pollutants. The Streets and Storm Drains Assessment or SSD identifies streets and/or storm drains that are in poor or failing condition using visual inspection. Street conditions, storm drain inlets and catch basins, contributing drainage area parking lots (if applicable), and municipal pollutant reduction strategies are documented in the SSD form. In Harris Creek, street conditions were documented in the SSD when numerous trash or hotspots were identified. In Harris Creek, storm drains were documented in the SSD when inlets and catch basins were identified for sediment, trash, or other pollution problems that inhibit the function of the storm drain network system. For detailed information about the SSD, refer to Wright et al., 2005.



## **Community Greening Opportunities and Retrofit Reconnaissance Investigation (RRI)**

Community greening opportunities were identified in the field that included community beautification, park or garden opportunities, and stormwater retrofits. The Retrofit Reconnaissance Inventory or RRI identifies potential treatment practices designed to address stormwater quantity or quality where no practice previously existed. These treatment practices, also known as retrofits, are designed to store, infiltrate, and/or treat stormwater runoff from as much development as possible. Stormwater retrofits differ from “regular” treatment practices mainly in terms of when they are installed – they are installed well after development is complete, rather than during or even before construction. For this reason, stormwater retrofitting can sometimes be difficult. Finding the space available to install stormwater treatment practices without negatively impacting existing uses of the land is not always possible. For additional information about the RRI, refer the Schueler et al., 2007. Each of the sites was assessed in the field by one of the two retrofit teams. Field work involved visiting the site, analyzing the drainage patterns to determine the contributing drainage area to the site, taking photographs, and making initial site measurements.

### ***Illicit Discharge Investigations***

Because the Harris Creek watershed is an entirely piped stream network, sampling for illicit discharges could not take place through outfall screening as is typically done in an open stream channel. Therefore, sampling occurred from street level by accessing manholes directly above major junctions within the storm drain system. These sites were identified ahead of time through a desktop assessment using GIS. An example map depicting the location of two water sampling points can be found in Appendix Figure 1.

The Center and staff from BWB conducted the first two days of sampling on 8/9/11-8/10/11. The Center and Baltimore City Surface Water Management Division staff conducted additional sampling on 11/1/11-11/3/11. Manholes observed to have flow were investigated using a variation of the outfall reconnaissance inventory (ORI) technique described in Brown et al. (2004). Water samples were screened for a number of illicit discharge indicators including flow (where possible), physical indicators and ammonia. Threshold levels for illicit discharge screening parameters are defined in Table 3. Four samples were collected from each flowing outfall and analyzed as indicated in Table 4. Ammonia was measured in the field and the remaining parameters were analyzed in a lab setting.



Appendix A Figure 1. Example map illustrating two sample locations (pink dots) chosen because they represent major junctions within the stormdrain system.

**Appendix A Table 2. Threshold levels for screening parameters used in Harris Creek illicit discharge surveys.**

Parameter	Threshold	Source
Ammonia	>0.1 mg/L	Brown et al (2004)
E. coli	235 CFU/100 ml (grab sample)	EPA (1986)
Total coliform	10,000 CFU/100 ml (grab sample)	California state standard (Dorfman and Rosselot, 2011)
Fluoride	0.25 mg/L	Brown et al (2004)
Detergents	0.25 mg/L	Brown et al (2004)
Potassium	>5 ppm	Guidance extrapolated from Lilly and Sturm (2010)

Appendix A Table 3. Illicit discharge analysis.					
	Parameters Analyzed	Equipment	Method	Location	Notes
Sample 1	Ammonia	LaMotte 1200 Colorimeter	Nessler method	Field	
Sample 2	Fluoride	Hannah HI 93729 Low Range Photometer	Adaptation of the SPADNS method	University of Baltimore, MD or Baltimore City Ashburton Filtration Plant	
	Anionic Surfactants	Chemetrics Detergent Kit	USEPA Methods for Chemical Analysis of Water and Wastes, Method 425.1 (1983)		
	Potassium	Horiba Cardy Compact Ion Meter C-131	Nitrate ion electrode method		
Sample 3	Total Nitrogen	--	Alkaline Persulfate Digestion of Nitrogen to Nitrate and Measured Using Enzyme Catalyzed Reduction <sup>1</sup>	Contracted to Horns Point lab for analysis	Samples frozen at end of field day
	Total Phosphorus	--	Alkaline Persulfate Digestion of Phosphorus to Orthophosphate <sup>2</sup>		

<sup>1</sup> USEPA. 1979. Method No. 353.2 *in* Methods for chemical analysis of water and wastes. United States Environmental Protection Agency, Office of Research and Development. Cincinnati, Ohio. Report No. EPA-600/4-79-020 March 1979. 460pp.

<sup>2</sup> USEPA. 1979. Method No. 353.2 *in* Methods for chemical analysis of water and wastes.

United States Environmental Protection Agency, Office of Research and Development. Cincinnati, Ohio. Report No. EPA-600/4-79-020 March 1979. 460pp.

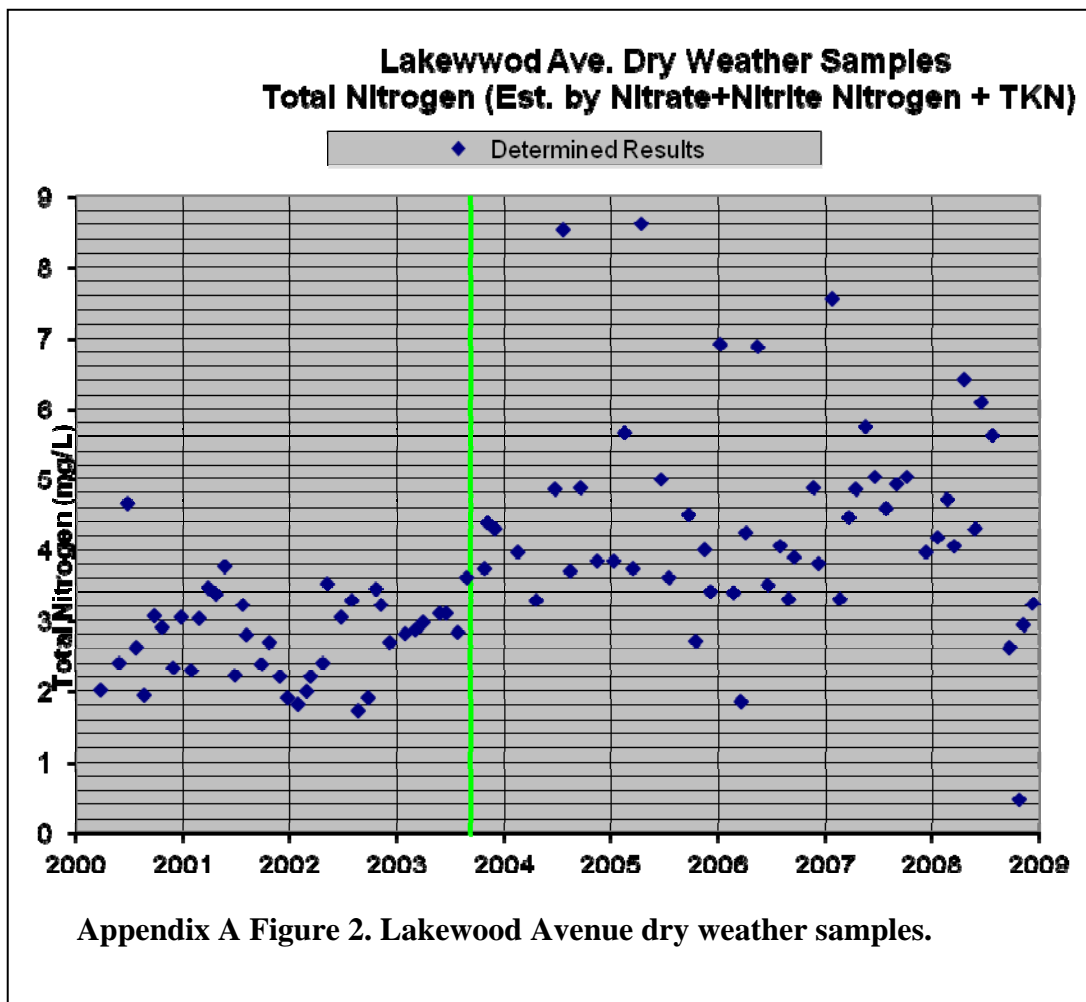
**Appendix A Table 3. Illicit discharge analysis.**

	Parameters Analyzed	Equipment	Method	Location	Notes
Sample 4	E. coli and Total coliform	3M Petrifilm plates	Incubated at 35° C <sup>3</sup> for 24 h ± 1 h; red and blue colonies with gas enumerated manually	CWP office in Ellicott City, MD	Samples plated no more than 6 hours after collection



### ***Pollution Reductions to Baltimore Harbor***

As described earlier in this report, we collected samples throughout the storm drain network to track, and isolate sources of bacteria and nutrients for their elimination. We also collected three samples on separate occasions at the Harris Creek Outfall at Boston Street to determine what effect the elimination of these sources would have on the bacteria and nutrient loadings to the harbor. Typically, monitoring projects that are designed to observe trends associated with actions such as pollutant source reduction occur over multiple years and require dozens of samples. We were limited by time and scope on this project but felt it useful to collect samples to see how these compared to a larger data base maintained by the Baltimore City Surface Water Division (SWMD).



The SWMD monitors seven major stormwater outfalls around the Harbor including the outfall at Harris Creek. Examples of these data are provided in Appendix A Figure 2.

The SWMD does not monitor flow to the harbor so it is difficult to convert their monitoring data to a loading (e.g., pounds per day) which is typically used by regulators for setting water quality

goals such as a Total Maximum Daily Load. Furthermore, the SWMD only collects samples during dry weather and stormwater can account for as much as 80 percent or greater of the annual loading. Still the data can provide useful information on sources of dry weather contaminants (e.g., sewage) which can have a larger on the potential recreational use of the harbor.

For this analysis we compared the average concentrations collected during the study with the long term average and the 10<sup>th</sup> percentile value (e.g. ten percent of the total sampling set equals or is less than this value) for all 7 harbor stations (Appendix A Table 4). The 10<sup>th</sup> percentile sample, while not scientific, is a good representation of the “ideal” concentration that would be expected under non-polluting conditions.

<b>Appendix A Table 4. Harris Creek and Baltimore Harbor contaminant data.</b>			
<b>Contaminant</b>	<b>Harbor mean</b>	<b>10<sup>th</sup> percentile</b>	<b>Harris Creek Study</b>
Total Phosphorus	0.20	0.04	0.10
Total Nitrogen	2.63	1.04	1.84

The results show that the samples collected under this study are substantially less than the long term harbor average but less than the 10<sup>th</sup> percentile value. The fact that the sample average is less than the long term average could be attributed to progress the SWMD has made over the past few years in eliminating sources of pollution. However, because the sample average is greater than the 10<sup>th</sup> percentile value, considerable progress is still needed. Again we should keep in mind that only three samples were collected. Also, the SWMD used different analytical methods for nitrogen and phosphorus analysis which could introduce bias when interpreting the results so this conclusion should be interpreted with caution.

## Appendix B. Upland pollution and community opportunity site data.

**Appendix B Table 1. List of Pollution Sites in Harris Creek Watershed. Severe sites are highlighted in blue and a selection of these are described above in the Pollution Reduction Strategies section.**

Location	Problem	Description
Fait Ave and S. Luzerne Ave.	Trash dumping	Overflowing public trash can at a bus stop that is currently proposed for elimination
Curley/Elwood Alley and Pulaski/Fayette Alley	Trash dumping	Illegal dumping of household trash in an alley
Chase/Eager Alley and North Milton Ave.	Trash dumping	Illegal dumping near railroad tracks
Curley/Elwood Alley and Madison/Monument Alley	Trash dumping	Plastic, tires, paper, residential waste
E. Madison St. and N. Madeira St.	Trash dumping	Plastic, appliance, paper, mattress
McElderry St. and N. Luzerne /N. Glover Alley	Trash dumping	Dumping of ~ 15 bags of household trash at the end of the alley
N. Rose/N. Luzerne Alley and McElderry St.	Trash dumping	Residential bags of trash and carpet dumped at end of alley
Preston/Biddle Alley and Bradford/Montford Alley	Trash dumping	Plastic, appliances, paper, construction materials
N. Rose St. and Hoffman/Grogan Alley	Trash dumping	Residential trash bags. Chronic dumping site.
North/Federal Alley and N. Rose St.	Trash dumping	Need truck to remove ~30 tires in abandoned lot. Also ~4 bags of residential trash is located near street
N. Montford Ave. and Lanvale/Federal Alley	Trash dumping	Construction and household trash
Montford/Port Alley and E. Lanvale St.	Trash dumping	Plastic and household trash
N. Bradford St. and Lanvale/Federal Alley	Trash dumping	Beds
N. Bradford St. and E. Federal St.	Trash dumping	Household trash
Llewelyn Ave. and N. Collington Ave. on vacant parcel	Trash dumping	Household trash including clothes
N. Broadway and E. Oliver St.	Trash dumping	Household trash including clothes
Bond/Bethel Alley and E. Federal St.	Trash dumping	Household trash
N. Fayette between N. Chapel St. and Wolfe/Chapel Alley	Trash dumping	Construction and household trash
E. 20th St. and Washington/Castle Alley	Trash dumping	Plastic, paper, construction, & waste from a yard sale. Large vacant lot where local dumping occurs
Ravenwood/Sinclair Alley and	Trash	Plastic, automotive, paper, construction, yard waste, &

**Appendix B Table 1. List of Pollution Sites in Harris Creek Watershed. Severe sites are highlighted in blue and a selection of these are described above in the Pollution Reduction Strategies section.**

Location	Problem	Description
Greenview Ave.	dumping	household waste
Large vacant land on E. Hoffman St. between N. Chester St. and N. Washington St.	Trash dumping	Household trash from a recent party/BBQ that is piled in bags near the street for pick up.
E. Federal St. and N. Washington St.	Trash dumping	Trash bags full and marked with City orange stickers. Chronic site for neighborhood dumping at the street corner and in the vacant store door/counter top area
Lafayette/Lanvale Alley and N. Bradford St.	Trash dumping	Abandoned lots and home near alley is used for dumping area. Plastic, appliances, paper, household waste
E. 25th St. and Clough/25th Alley	Trash dumping	Chronic neighborhood dumping site at Clifton Park over the embankment edge where Sinclair Lane and Clifton Park meet. Tires, automotive, bagged household trash
N. Rose St. between E. Hoffman St. and E. Preston St.	Trash dumping	Alley is a chronic dumping area where three dump sites were identified.
Darley/North Alley between McDonough St. and Broadway/Wolfe Alley	Trash dumping	Vacant lots with trash in backyard. Dog waste in back cement block yard observed. Narrow alley with broken glass, small debris throughout. Chronic dumping area.
E. 25th St. between Clough/25th Alley and Harford Rd.	Trash dumping	Sinclair Lane has trash strewn down the road toward Clifton Park Behind this street (to the southwest) the alley has multiple dumping sites. All neighborhood vacant lots are prone to dumping areas. Potentially this would be a good area for a large dumpster to be placed with regular City pick up.
Near 2500 Jefferson Street, New Lebanon Calvary Baptist Church	Trash dumping	Household trash throughout alley. Weeds present.
2506 to 2508 Jefferson Street	Trash dumping	Lot with basement holding water and trash that washed off from the road into the standing water. Also, on the north side of the lot near the alley household trash dumping observed.
Alley of 500 Glover that includes 500, 506, 508, 510, 523, 537 N Luzerne	Trash dumping	Multiple vacant lots with extensive household trash accumulation over long periods of time. Household trash present in the alleys.
Alley near 501 N. Glover	Trash dumping	Household trash that includes couch, carpets, and trash bags.
Alley behind 463 N. Luzerne. Jefferson and Orleans intersection & Luzerne Glover alley.	Trash dumping	Household trash that includes couch parts, mattress, bagged trash, and trash can with no lid.
Alley at 2301 N. Madison	Trash dumping	Household trash that includes plastics, furniture, etc. High weeds and trash in weeds
Vacant lots and alley behind 703 to 707 N. Patterson Park Avenue	Trash dumping	Trash bags in the alley, trash cans with trash and no lid in the alley. Vacant lot dumping that includes residential trash, mattresses, car seat, etc.
Alley behind PJ Carry Out @ 622 N.	Trash	Mattresses, bags of residential trash, some construction

**Appendix B Table 1. List of Pollution Sites in Harris Creek Watershed. Severe sites are highlighted in blue and a selection of these are described above in the Pollution Reduction Strategies section.**

Location	Problem	Description
Luzernen Ave	dumping	trash. Trash at each end of the alley. Weeds are an issue in the alley.
Alley near 623 N. Luzerne Avenue	Trash dumping	Household trash in bags and strewn in the alley.
Vacant lot behind 822 N. Milton Avenue	Trash dumping	Trash bags in the alley, trash cans with trash and no lid in the alley. Vacant lot dumping that includes residential trash, mattresses, etc. 15 bags of trash. Residents state they do not like the amount of trash in near their back yard.
Alley near 702 N. Rose	Trash dumping	Trash cans with no lid, chair, trash in bags and in the alley. Rat sited.
Vacant lot behind 2500 McElderry Street in an alley named McElderry Allen Jefferson	Trash dumping	Bags of trash in vacant lot and in alley of McElderry-Alen-Jefferson that is between N. Rose St. and N. Milton Street (just south of 2500 McElderry Street). Evidence of dumping and people staying in the area.
Mouth of Alley at North Chester Street and E. North Avenue. GIS indicates name of alley is North-Alley-Lafayette	Trash dumping	Trash in alley that is near intersection of N. Chester St. and E. North Avenue. Evidence of dumping and people staying the area.
2622 Ashland Avenue	Trash dumping	Basement window removed and dumping trash in the vacant space.
2620 Ashland Avenue	Trash dumping	Household trash and pieces of a bed.
2700 Ashland Avenue (behind this address)	Trash dumping	Household trash in alley.
2726 to 2730 Ashland Avenue	Trash dumping	Three rats observed. Dumping is in the back yard of abandoned lots. Tree down on power line. Residents said they reported (to whom is unknown), but the tree remains downed since Hurricane Irene. Residents at 900 N. Kenwood Avenue complained of rats and downed tree. They asked for street trees on the block (see HC-RRI-B-802)
905 N. Belnord Avenue	Trash dumping	Vacant lot back yard, where doors and other home component were dumped. Also present were dressers, screens, carpet, etc.
701 N. Rose Luzerne	Trash dumping	Appears someone moved and dumped their items on concrete slab. Also present are kitchen & household trash.
707 N Lakewood Avenue	Trash dumping	Approximately 20 bags of trash in alley behind 707 N Lakewood Avenue
2404 & 2412 Biddle-Chase Alley	Trash Dumping	Two abandoned lots with trash and dumping.
2438 & 2440 Chase Street	Trash Dumping	Two abandoned lots with trash and dumping. House in serious dierepair.



**Appendix B Table 1. List of Pollution Sites in Harris Creek Watershed. Severe sites are highlighted in blue and a selection of these are described above in the Pollution Reduction Strategies section.**

Location	Problem	Description
1118 Milton Avenue	Trash Dumping	Abandoned home that is being used as a dumping area.
1323 N. Milton Avenue	Trash Dumping	Abandoned home that is being used as a dumping area.
736 N. Patterson Park Avenue	Trash Dumping	Dirty alley and dumping behind abandoned house.
2312 E. Monument Street	Trash Dumping	Tire dumping behind business.
E. Fayette St. & N. Milton Ave.	Clogged Catch Basin Inlet	Inlet is completely clogged with sediment and trash. Homeowner is pressure washing and water is ponding over the inlet and bypassing it.
N. Luzerne Ave. /E. Chase St.	Clogged Catch Basin Inlet	Trash and debris blocking catch basin inlet
1001 N Luzerne & E. Eager St	Clogged Catch Basin Inlet	Clogged catch basin.
960 N Lakewood Avenue	Clogged Catch Basin Inlet	Clogged catch basin. Sediment, trash, etc. in the catch basin is visible at street level. This catch basin is not functioning.
Sinclair/Federal Alley between N. Rose St. and N. Luzerne St.	Potential Hotspot	Car storage & auto body work; Suggest follow-up on-site inspection*
H&H Autobody Repair, Sinclair Ln. and Belair Rd.	Potential Hotspot	Car repair; Suggest follow-up on-site inspection*
Victor Auto Works, corner of N. Chester St. and E. North Ave.	Potential Hotspot	Car repair; Suggest follow-up on-site inspection*
JBA Auto, 1600 Clough St.	Potential Hotspot	Car repair; Suggest follow-up on-site inspection*
Sinclair Ln. and N. Rose St. (near Belair Rd.)	Potential Hotspot	Autobody shop; Suggest follow-up on-site inspection*
144 N. Decker-Ellwood Alley	Potential Hotspot	Residential Alley; test for illicit discharge from water draining from small alley in parking pad
Tim Murphy Collision Center - E. Madison St.	Potential Hotspot	Autobody shop; Improve vehicle operations practices
End of N. Linwood Ave. near train tracks	Potential Hotspot	Cement, asphalt recycling center; Potential illicit discharge from conveyor belt discharge directly to storm drain
R.A. Brooks Company, 1020 N. Linwood Ave.	Potential Hotspot	Possible water main break; green slime/algae on driveway apron
SE corner of Biddle St. & Patterson Park Ave.	Confirmed Hotspot	Construction/redevelopment; refer for immediate erosion and sediment control enforcement
Auto Repair Ltd, N. Luzerne Ave. and E. Monument St.	Potential Hotspot	General "good practices" for vehicle operations needed; lack of waste management. Suggest follow-up on-site inspection.

**Appendix B Table 1. List of Pollution Sites in Harris Creek Watershed. Severe sites are highlighted in blue and a selection of these are described above in the Pollution Reduction Strategies section.**

Location	Problem	Description
Abandoned home at 2601 N. Jefferson St	Potential Hotspot	Garden hose running water out of a basement level window into the alley. Met with Micahel Hanley, with Code Enforcement Official for Baltimore Housing and he will contact home's owner and report the hotspot
Mobile Car Wash 1100 block corner of North Patterson Park and Chase	Potential Hotspot	Car wash that is operated from a residence. This car wash has been in operation for at least three years and discharges directly to a storm drain on Patterson Park Road. Two other mobile car wash operations were noted in the area.
2599 to 2620 East Eager Street	Potential Hotspot	General Storage, Auto Storage, & Auto Repair.* Suggest follow-up on-site inspection.
720 N. Luzerne Avenue	Potential Hotspot	Water line leak.
2600 Ashland Avenue	Potential Hotspot	Water line leak.

\*Sites were not fully assessed due to safety concerns and should be fully assessed by the proper authority.

**Appendix B Table 2. Potential community opportunity sites.**

Location	Opportunity	Group to Take Lead in Implementation
408/412 N. Milton Avenue	Rainwater Harvesting	Community Group, Watershed Group
Near 405 N. Milton Avenue	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
400 N. Luzerne, Captivate Church	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Green space near 2401 McElderry Street	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Tench Tilghman School, 600 Block of Patterson Park Avenue and Bradford	Partner with school to see what potential retrofit they want. To be determined (TBD).	Community Group, Watershed Group
915 N. Montford Avenue	Bioretention	Community Group, Watershed Group
926 N. Montford Avenue	Porous Pavement or Pervious Pavers for a playground surface	Community Group, Watershed Group, Higher Technical Assistance
2333 East Eager Street (A & B)	(A) Tree planting/revegetation, community park (B) Bioretention	(A) Community Group, Watershed Group (B) Community Group, Watershed Group, Higher

Appendix B Table 2. Potential community opportunity sites.		
Location	Opportunity	Group to Take Lead in Implementation
		Technical Assistance
950 N. Patterson Park Ave.	Bioretention, Tree planting/revegetation	Community Group, Watershed Group, Higher Technical Assistance
N Milton Avenue (east side of street) between Ashland Ave and E. Madison St.	Tree planting/revegetation, planters, street greening	Community Group, Watershed Group
Jefferson Street & intersections of N. Madera (outside McElderry Park neighborhood), N. Port, N. Rose, & N. Glover (A, B, C, and D)	Roundabout with bioretention	Community Group, Watershed Group, Higher Technical Assistance, Baltimore City Dept. of Transportation
North Port Street overgrown Alley-Biddle Chase	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Corner of North Gay Street and North Patterson Park Road	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
East Federal Street between N. Luzerne Avenue and North Patterson Park Road	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Near 906 N Lakewood Ave	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Curley Ellwood/Madison-monument Intersection	Community Garden	Community Group, Watershed Group, City of Baltimore
900 block of N. Kenwood Ave. (east side of block)	Tree planting on the block	Community Group, Watershed Group, Higher Technical Assistance, and City of Baltimore
901 block of N. Kenwood Ave. (west side of block)	Tree planting on the block	Community Group, Watershed Group, Higher Technical Assistance, and City of Baltimore
1000 N Kenwood & E. Eager Street	Bioretention	Community Group, Watershed Group, Higher Technical Assistance
1000 Block of N. Lakewood	Rain Garden or Bioretention	Community Group, Watershed Group, Higher Technical Assistance, and City of Baltimore

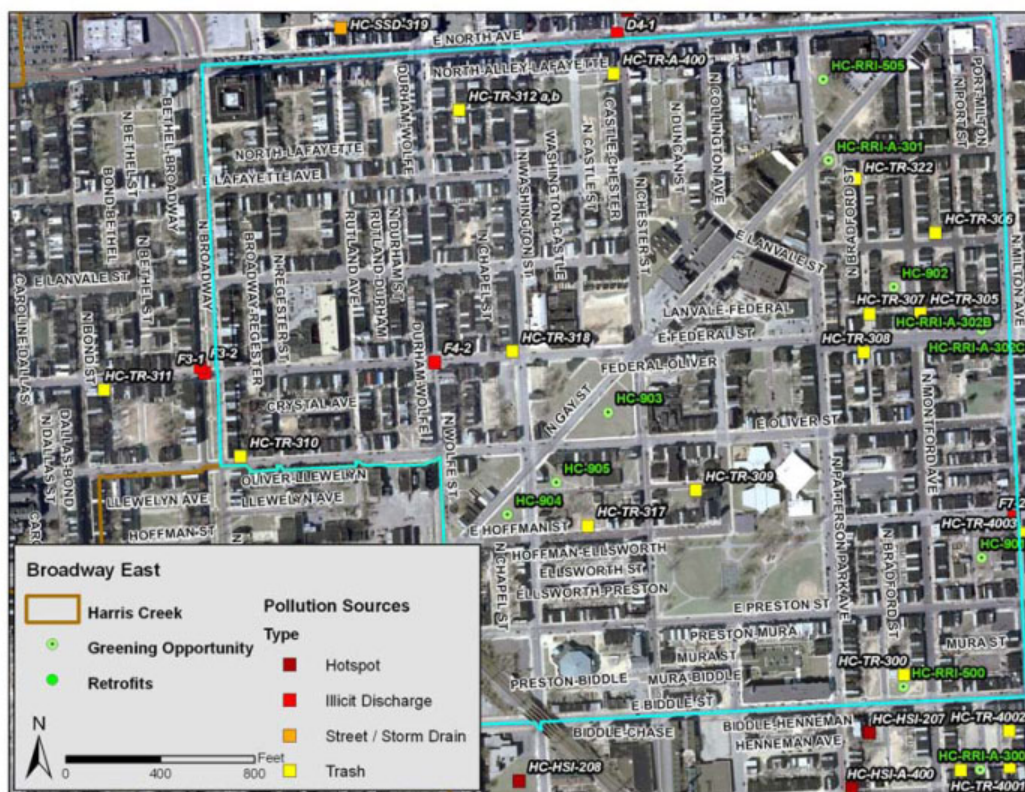
Appendix B Table 2. Potential community opportunity sites.		
Location	Opportunity	Group to Take Lead in Implementation
Bocek Park	Rain Garden or Bioretention	Community Group, Watershed Group, Higher Technical Assistance
Bocek Park	Water Park	Community Group, Watershed Group, Higher Technical Assistance
Biddle & Montford Streets / Bradford & Biddle Streets	Deep till / Permeable recreation space	Community Group, Watershed Group, Higher Technical Assistance
1323 N. Rose Street	Deep till / community space; Community Garden	Community Group, Watershed Group, Higher Technical Assistance
End of Milliman Street	Deep till; plan may already be in place for this space	Community Group, Watershed Group, Higher Technical Assistance
600 Block of Patterson Parks Ave near Bradford	Bioretention	Watershed Group, Higher Technical Assistance
Federal & Potomac Streets	Bioretention	Watershed Group, Higher Technical Assistance
N. Rose and Llewelyn Streets	Deep till / Grade to handle runoff from adjacent houses; Add trees, horseshow pit, patio and other community amenities	Community Group, Watershed Group
Gay & Patterson Park Ave	Community Park	Community Group, Watershed Group
Bradford – Montford & Lanvale	Deep till / tree planting	Community Group, Watershed Group, Higher Technical Assistance
Gay St. between Federal and Oliver	Deep till and tree planting; add trash and recycling cans at bus stop	Community Group, Watershed Group, Higher Technical Assistance
Gay St between Washington and Hoffman	Deep till and tree planting; add trash and recycling cans at bus stop; remove concrete cut through	Community Group, Watershed Group, Higher Technical Assistance
Llewelyn Ave and Washington	Bioretention	Community Group, Watershed Group, Higher Technical Assistance

## Appendix C. Neighborhood pollution source and opportunity maps.



Appendix C Figure 1. Biddle Street neighborhood pollution source and opportunity maps.









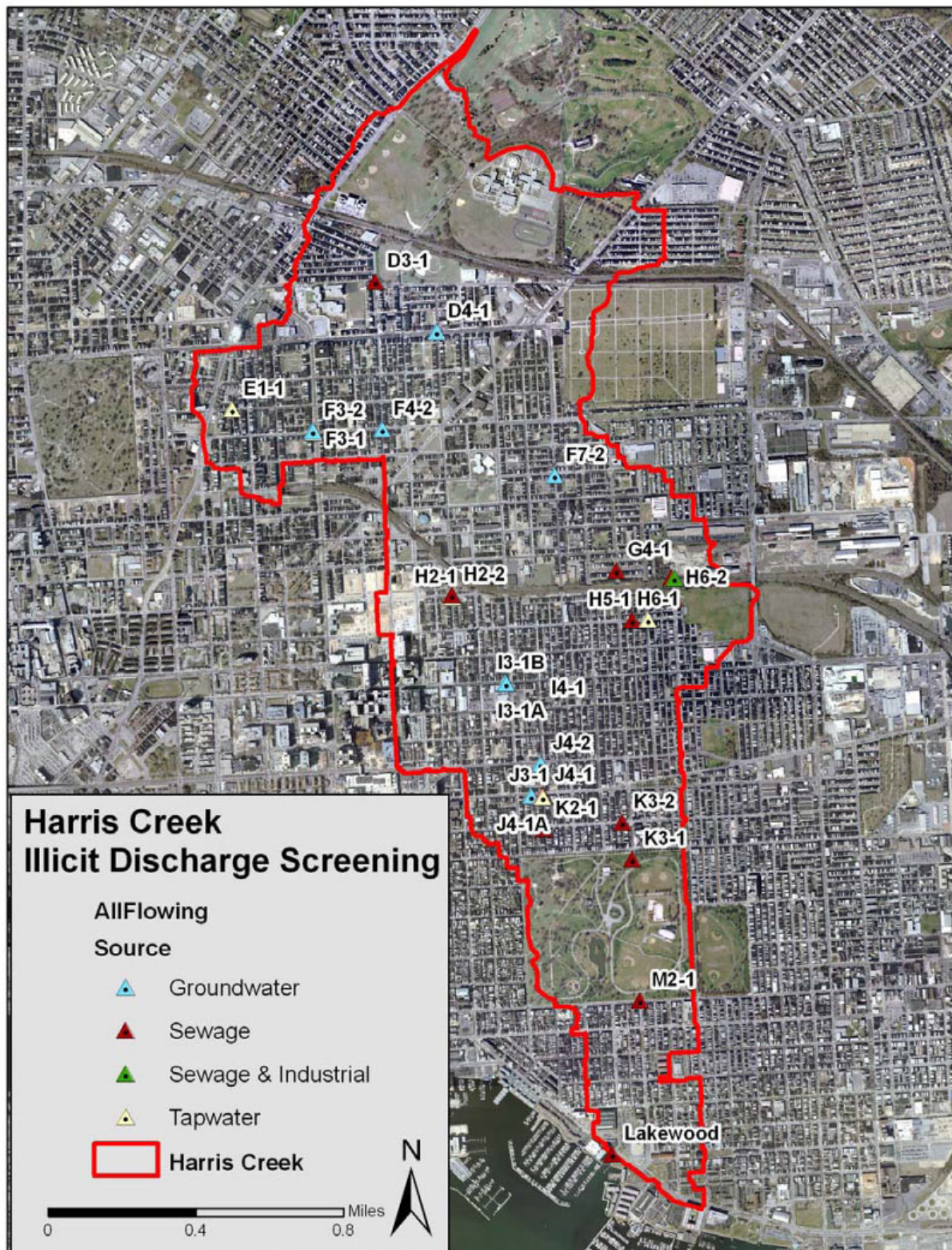
Appendix C Figure 4. McElderry Park neighborhood pollution source and opportunity maps.



Appendix C Figure 5. Berea neighborhood pollution source and opportunity maps.



## Appendix D. Illicit Discharge Pollution Sources Map.



## **Appendix E. Harris Creek illicit discharge data.**

**Appendix E Table 1. Harris Creek Illicit Discharge Survey August 9-10 & November 1-11, 2011.**

Investigator	Manhole ID	Location	Field NH3 (mg/L)	K (ppm)	FI (mg/L)	Detergents (ppm)	Conductivity (µS)	E. coli (CFU / 100 ml)	Total coliform (CFU / 100 ml)	TP (mg/L)	TN (mg/L)	Notes
LAL/BPS/LFM/ David Flores/Lauren Poor	D3-1	Wolfe St & Sinclair - next to Clifton Park	0.53	10	1.06	0.25	1070	18000	23100	0.040	3.948	Sewage smell
LAL/LFM	D4-1	Chester & Sinclair	0.18	3	0.53	0.13	490	0	600	0.130	1.680	Sample was filtered; reddish-brown sheen
LAL/LFM	E1-1	Spring and Lanvale	0.18	3	0.75	0.00	320	200	4600	0.023	1.396	Traced up Spring; appears to have been a fire hydrant release causing large volumes of water; also found copper pipe discharging tap water with some ammonia (0.17) in an alley and a small trickle of flow with ammonia hit (0.24) at Lafayette and Spring - City went back later that day and flow still present but ammonia was 0.0
LAL/LFM	F3-1	Federal and Broadway (on Federal)	0.12	3	0.71	0.00	350	0	0	0.013	1.428	n/a
LAL/LFM	F3-2	Federal and Broadway (on Broadway)	0.17	5	0.56	0.00	390	0	5800	0.063	1.722	n/a
LAL/LFM	F4-2	Federal & Wolfe	0.03	3	0.64	0.00	330	0	0	0.007	1.296	City found broken water valve in the 1900 block of E. Federal St.



**Appendix E Table 1. Harris Creek Illicit Discharge Survey August 9-10 & November 1-11, 2011.**

Investigator	Manhole ID	Location	Field NH3 (mg/L)	K (ppm)	FI (mg/L)	Detergents (ppm)	Conductivity (µS)	E. coli (CFU / 100 ml)	Total coliform (CFU / 100 ml)	TP (mg/L)	TN (mg/L)	Notes
LAL/LFM	F7-2	Milton & Hoffman	0.16	9	0.42	0.13	1130	100	2600	0.041	1.862	n/a
LAL/BPS/LFM	G4-1	Lakewood and Beryl	0.6	7	0.5	1.75	750	3000	15000	0.065	1.904	City tracked to sanitary line in the 1100 block of Milton Ave; City will turn over to WWE
LAL/BPS/LFM	H2-1	Eager & Chester	0.17	3	0.9	0.13	410	0	5600	0.0330	1.4700	Likely water main break; large amount of flow
LAL/LFM	H2-2	Chester & Eager	0.5	13	0.49	>3	990	600	14600	0.037	3.122	Tracked to residence at 1101 Patterson Park Ave conducting car wash business from street
LAL/BPS/LFM	H5-1	Ashland & N. Belnord	2.05	5	0.81	>3	380	n/a	n/a	0.4340	7.3220	Homeowner washing in alley was likely source of at least a portion of the flow; ammonia in the alley flow was 0.57 mg/l so another source may be present; re-test at later time; City reports that this has been declared an SDUO
LAL/BPS/LFM	H6-1	Ashland & Kenwood	0	7	0.73	0.13	840	100	800	0.0310	1.8760	Parallel drains - one on top of the other; sample is a composite of the two and no way to sample separately

**Appendix E Table 1. Harris Creek Illicit Discharge Survey August 9-10 & November 1-11, 2011.**

Investigator	Manhole ID	Location	Field NH3 (mg/L)	K (ppm)	FI (mg/L)	Detergents (ppm)	Conductivity (μS)	E. coli (CFU / 100 ml)	Total coliform (CFU / 100 ml)	TP (mg/L)	TN (mg/L)	Notes
LAL/BPS/LFM	H6-2A	Linwood and Eager	0.86	30	0.38	0.13	1690	0	1500	0.015	2.212	Across the street from recycling plant; seepage from crack in driveway
LAL/BPS/LFM	H6-2B	Recycling plant	0.56	73	0.6	0.25	1160	200	3400	0.028	3.864	Recycling plant pond water overflowing onto street; City to contact Pollution Control & MDE
LAL/BPS/LFM	I3-1A	Monument and Patterson Park (west)	0	7	0.68	0.00	320	0	700	0.016	1.526	n/a
LAL/BPS/LFM	I3-1B	Monument and Patterson Park (east)	0.01	6	0.54	0.00	280	0	0	0.012	1.397	n/a
LAL/BPS/LFM	I4-1	McElderry and Montford	0.12	9	0.74	0.13	350	0	600	0.025	1.512	n/a
LAL/BPS/LFM	J3-1	Fayette & N. Bradford	0.22	10	0.59	0.00	320	0	0	0.016	0.953	n/a
LAL/BPS/LFM	J4-1	Fayette and Montford	0.12	25	0.39	0.50	3.3 mS	0	800	0.116	2.044	n/a
LAL/BPS/LFM	J4-1A	Fayette/Montford and Dr. Willie's Way	n/a	10	0.56	0.00	480	0	0	0.0000	0.0000	n/a
LAL/LFM	J4-2	Montford and Orleans	0	3	0.51	n/a	330	0	0	0.006	1.105	Problem tracked to water main break at 2311 Orleans St

**Appendix E Table 1. Harris Creek Illicit Discharge Survey August 9-10 & November 1-11, 2011.**

Investigator	Manhole ID	Location	Field NH3 (mg/L)	K (ppm)	FI (mg/L)	Detergents (ppm)	Conductivity (μS)	E. coli (CFU / 100 ml)	Total coliform (CFU / 100 ml)	TP (mg/L)	TN (mg/L)	Notes
LAL/BPS/LFM	K2-1	Fairmont & Montford	1.61	14	0.58	0.50	450	TNTC	TNTC	0.329 K21B – <b>3.410</b>	6.692 K21B – <b>41.86</b>	City was tracking down; needed to access a manhole but a car was parked on top both days; MH at Patterson Park Dr and Fairmont was dry; flow at Bradford and Fairmont; flow increased and decreased several times while observed
LAL/BPS/LFM	K3-1	Baltimore St near Patterson Park, north end	0.53	9	0.79	0.25	730	2600	18600	0.1020	4.1720	City has a problem isolated upstream of this point
LAL/BPS/LFM	K3-2	Fairmont & N. Glover	0.3	5	0.68	Unreadable	560	400	6900	0.0710	1.8200	n/a
LAL/BPS/LFM/ David Flores/Lauren Poor	Lakewood Ave Outfall		0.8	n/a	0.69	n/a	n/a	500	8100	0.064	1.582	Salinity = 4 ppt; oil in discharge and precipitate in sample water
LAL/BPS/LFM	M2-1	Eastern & Lakewood - edge of Patterson Park	0.12	5	0.76	Unreadable	650	2400	20400	0.0690	3.8360	n/a

## **Appendix F. Neighborhood greening plans.**

A neighborhood greening plan for implementation of the above pollution reduction strategies and community greening opportunities was developed for the Madison East End and McElderry Park neighborhoods; similar plans can be developed for the other neighborhoods. A Neighborhood Greening Plan represents a bottom up call to action, as called for in the Healthy Harbor Plan (CWP and Biohabitats, 2011). A greening plan provides a means for the individual, household, businesses, institutions and neighborhoods to become stewards dedicated to improving their own community as well as the Harbor. The Neighborhood Greening Plans aim to meet goals of the Healthy Harbor Plan by reducing bacteria, trash, nutrients and sediment to the Harbor so that it may be fishable and swimmable by 2020 while maximizing benefits to the residents of the communities.

The reduction of bacteria and trash are the most critical elements for making the Harbor safe for swimming. Because the major source of bacteria to the Harbor is sewage discharges from sanitary sewer overflows (SSOs) and illicit discharges (CWP and Biohabitats, 2011), implementation of measures that eliminate these sources are considered most critical to meeting the bacteria reduction goal. However, focusing restoration efforts on sewage discharges alone ignores the additional benefits to the community that could be gained from implementation of “green infrastructure” practices. Green infrastructure practices use processes that are found in natural systems (e.g., infiltration, evapotranspiration) to reduce and treat stormwater runoff. Because green infrastructure practices typically incorporate vegetation into their design, they can improve quality of life in addition to improving water quality and being very cost effective. Some of the documented benefits of increased neighborhood greening include enhanced recreation, energy savings, and increased home values.

Vacant properties in Baltimore City provide an enormous opportunity for the installation of stormwater retrofits. Most of these properties have little or no redevelopment potential. BMPs applicable for vacant lots include bioretention, permeable paving, ponds, wetlands, sub-soiling, soil amendments, reforestation and tree planting. Some vacant properties were assessed for their potential to treat stormwater or provide community greening benefits during this study. Where a project was called out on vacant land, the parcel was identified as either public or private if this information was available. Likewise, Blue Water Baltimore (BWB) is currently engaged in an effort called the Clean Water Community Initiative, which is assessing the vision and capacity of twenty neighborhoods around the

City to engage in greening efforts, including four in the Harris Creek watershed, two of which are also presented below: Madison East End and McElderry Park.

A few key resources to assist with Neighborhood Greening efforts include the following:

Legacy dumping sites on abandoned lots can be turned into functional green spaces that can be used and cared for in the future by neighbors. These spaces can be planted with trees, converted to community gardens, used for community BBQs, installed with water features, and so on.

- Baltimore Green Space (<http://baltimoregreenspace.org>) provides a useful guide to turn abandoned lots into functional green spaces.
- The Adopt-A-Lot Program can be used to assist neighborhoods in this process:  
[http://www.baltimorehousing.org/vtov\\_adopt](http://www.baltimorehousing.org/vtov_adopt).
- The Community Greening Resource Network (<http://www.parksandpeople.org/greening/resource-network/>) provides assistance to community and school gardens across the City.

Tree planting initiatives can beautify a street, clean stormwater, and provide additional benefits such as noise reduction.

- Baltimore City's Street Tree Request Form  
[http://www.parksandpeople.org/files/resources/2464\\_Tree%20Planting%20Request%20Form.pdf](http://www.parksandpeople.org/files/resources/2464_Tree%20Planting%20Request%20Form.pdf)

The Gating and Greening Alleys Ordinance allows the Department of General Services (DGS) to receive, evaluate and process requests for alley gating and/or greening. Generally, alleys are eligible if the adjacent structures are mostly residential; the alley is no longer needed for through pedestrian or vehicular traffic; and the gating and/or greening will promote public health, safety or welfare.

- Baltimore City's Alley Greening and Gating Program  
<http://www.baltimorecity.gov/Government/AgenciesDepartments/GeneralServices/AlleyGatingGreeningProgram.aspx>

In Madison East End, ten pollution sources were identified (Appendix F Table 1) and nine community greening opportunities (Appendix F Table 2). See Appendix F Figure 1 for a map of the locations.

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**Appendix F Table 1. Pollution Sources in the Madison East End Neighborhood**

Site Id	Type of Pollution	Notes
TR-B-604	Trash	Illegal dumping of residential trash; diffuse across several abandoned lots; rats
TR-B-605	Trash	Illegal dumping of furniture in abandoned lot
TR-209	Trash	Illegal dumping of residential trash; not legacy
HSI-201	Trash	Auto-body shop; good housekeeping measures needed
HSI-B-702	Hotspot	Water line leak

**Appendix F Table 2. Greening Opportunities in the Madison East End Neighborhood.**

Site Identification	Notes
HC-RRI-B-800	Bioretention for street, roof & alley
HC-RRI-B-801	Community Garden
HC-RRI-B-802 a & b	Tree planting
HC-RRI-B-803	Bioretention for road and railway
HC-RRI-B-804	Bioretention for turf; high visibility
HC-RRI-B-805	Bioretention for road and railway
HC-RRI-B-806	Water Park in park; high visibility
HC-6	400-500 planters and plants to green homes along Madison Ave and neighborhood. This area is a major thoroughfare for people coming into the City toward Hopkins. Also identified 3 locations for tree-pits. ~\$8,000
HC-9	Owner is trying to get site re-zoned to install hand car wash and possible day C.A.R.E. center for the community. Site is large and has lots of green space. Owner would like to make site good demo for environmental practices – how to treat stormwater on-site. ~\$5,000

Short-term implementation strategies are described here. These measures will result in immediate remediation of trash problems but, for long-term sustainability, they should be coupled with the long term measures that are outlined in the next section. Recommended short term implementation strategies include:

- Trash sweep for five identified dumping sites in the neighborhood;
- Add 10 public trash receptacles;

- Distribute free trash cans and recycling bins to at least 100 residents;
- Clean out at least 20 clogged storm drains and install inlet screens on stormwater catch basins;
- Recommend to the City of Baltimore to visit and inspect the Hotspot sites identified; and
- Report any new dumping to the City of Baltimore

Long-term measures recommended for implementation in the Madison East End neighborhood are those that can foster a sense of stewardship and ownership with the community. Recommended short term implementation strategies include:

- Plant 10 to 12 trees at RRI-B-802 A & B located on the 900 block of North Kenwood Avenue;
- Create one community green space at HC-RRI-B-801 via the Baltimore Green Space programs; neighbors to determine designated use (e.g., art, garden space, or community);
- Stencil storm drains in the neighborhood and have a community competition to determine the design; and
- Install one bioretention area to treat pollution hotspot at HC-RRI-B-803 or HC-RRI-B-805.

### McElderry Park Neighborhood Greening Plan

In McElderry Park, thirteen pollution sources were identified (Appendix F Table 3) and 11 community greening opportunities (Appendix F Table 4). See Appendix F Figure 2 for a map of the locations.



Appendix F Figure 2. McElderry Park Pollution Sources and Greening Opportunities.

Appendix F Table 3. Pollution Sources in the McElderry Park Neighborhood.		
Site Id	Type of Pollution	Notes
HC-HSI-B-500	Trash	5-7 bags of trash in the alley near 2500 Jefferson Street. Weeds present.
HC-TR-B-500	Trash	Illegal dumping of residential trash throughout the alley; public property. 5-7 bags of trash.
HC-TR-B-501	Trash	Illegal dumping of residential trash throughout the alley; public property. Plastic, Tires, TV, Residential waste. 8 bags of trash. Lot with basement holding water and trash that washed off from the road into the standing water. Also, on the north side of the lot near the alley people are beginning to dump household trash at the site.
HC-TR-232	Trash	Alternative ID: HC-TR-B-502. Weeds and trash in abandoned

**Appendix F Table 3. Pollution Sources in the McElderry Park Neighborhood.**

Site Id	Type of Pollution	Notes
		vacant lot.
HC-TR-B-503	Trash	Illegal dumping of residential trash throughout the alley; public and private property. Extreme amount of trash in the abandoned lots back yards and trash in the alley. 40 bags of trash or more. City Code Enforcement visited and reported this site - extensive, long term dumping in vacant lots and also dumping in the alley.
HC-TR-B-504	Trash	Illegal dumping of residential trash throughout the alley; public property. Couch, carpets, trash bags (about 8-12 bags) + couch.
HC-TR-B-505	Trash	Illegal dumping of residential trash throughout the alley; public property. Couch parts, mattress, bagged trash, and trash can with no lid. 5 bags of trash.
HC-TR-B-508	Trash	Illegal dumping of residential trash throughout the alley; public property. 10-15 bags of trash.
HC-TR-B-509	Trash	Illegal dumping of residential trash throughout the alley; public property. 8 bags of trash.
HC-TR-B-513	Trash	Illegal dumping of residential trash throughout the alley; private property. 8-12 bags of trash n vacant lot and in alley of McElderry-Allen-Jefferson that is between N. Rose St. and N. Milton Street (just south of 2500 McElderry Street). Evidence of dumping and people living in the area.
HC-HSI-B-702	Hotspot	Water line leak.
HC-SSD-230	Streets and storm drains	Inlet is completely clogged with sediment and trash. Homeowner is pressure washing and water is ponding over the inlet and bypassing it.
I4-1	Illicit Discharge	Likely water main break.

**Appendix F Table 4. Greening Opportunities in the McElderry Park Neighborhood.**

Site Identification	Notes
HC-RRI-B-401	Rainwater harvesting; Rain barrels, planters, regrade, and regrass between two vacant lots
HC-RRI-B-402	Bioretention for roof and road; CDA 7727 sq ft.; Curb cut to capture roadway runoff
HC-RRI-B-403	Bioretention for road runoff (public property)
HC-RRI-B-404	Bioretention for road runoff
HC-RRI-B-405	Bioretention at Tench Tilghman school
HC-RRI-B-411b	Roundabout with bioretention on public property
HC-RRI-B-411c	Roundabout with bioretention on public property
HC-RRI-B-411d	Roundabout with bioretention on public property
HC-RRI-503	Use vacant lot for bioretention to treat Tench Tilghman School parking lot and playground
HC-900	Remove impervious cover; stabilize parking area in vacant lot with gravel
HC-10	Tree plantings. Community has already conducted a survey of how many and where trees are needed. Just need funding to get trees in the ground.

Appendix F Table 4. Greening Opportunities in the McElderry Park Neighborhood.	
Site Identification	Notes
	Would like to use cherry trees if possible. Stormdrain stenciling throughout neighborhood. ~\$2,300
HC-11	To alleviate flooding issues, this neighborhood would be a good target area for the proposed green street retrofits (types 1-3). ~\$30,000

Short-term implementation strategies are described here. These measures will result in immediate remediation of trash problems but, for long-term sustainability, they should be coupled with the long term measures that are outlined in the next section. Recommended short term implementation strategies include:

- Trash sweep for 11 identified dumping sites in the neighborhood;
- Add 10 public trash receptacles;
- Distribute free trash cans and recycling bins to at least 100 residents;
- Clean out at clogged storm drain HC-SSD-230 and install inlet screen on stormwater catch basin;
- Recommend to the City of Baltimore to visit and inspect the Hotspot site identified (HC-HSI-B-500); and
- Report any new dumping to the City of Baltimore

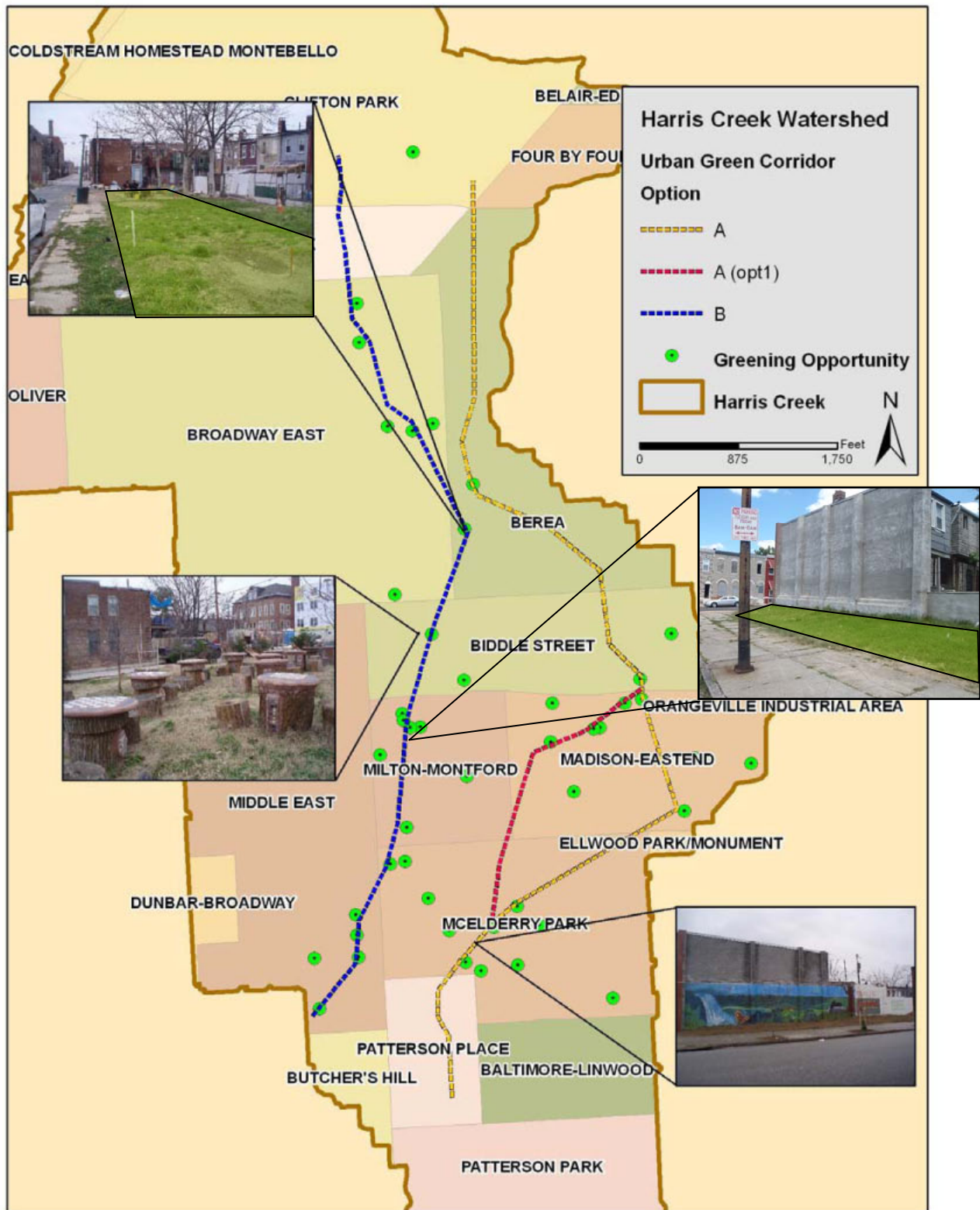
Long-term measures recommended for implementation in the McElderry Park neighborhood are those that can foster a sense of stewardship and ownership with the community. Recommended short term implementation strategies include:

- Plant 20 to 30 trees at HC-10;
- Work with Tench Tilghman school on project implementation; and
- Implement example rainwater harvesting system at HC-RRI-B-401.

### **Harris Creek Neighborhood Greenway**

The above projects can be vetted with the community and coupled with the visioning process undertaken by BWB in Madison East End and McElderry Park to complete an interconnected Neighborhood Urban Corridor that stretches from the Patterson Park to Clifton Park (Appendix F Figure 3). The goal of the project would be to engage, empower and educate citizens about the Harris Creek watershed through a series of interconnected stormwater and community greening projects that simultaneously build awareness of the watershed through greening projects, artistic storm drain stenciling and wall murals that emphasize a sense of place in the watershed. Efforts such as these are already underway in the watershed as can be seen from some of the photos in Appendix F Figure 3. An additional compatible benefit of stormwater treatment can be added to projects such as these such that intended uses are not compromised. For example, infiltration practices can be added to some spaces so that social and recreation opportunities are maintained while providing an unobtrusive benefit to water quality. The Urban Green Corridor between the parks could be additionally enhanced by encouraging biking and walking paths through the corridor and re-directing traffic to other streets.





Appendix F Figure 3. Harris Creek Urban Green Corridor options from Patterson Park to Clifton Park.