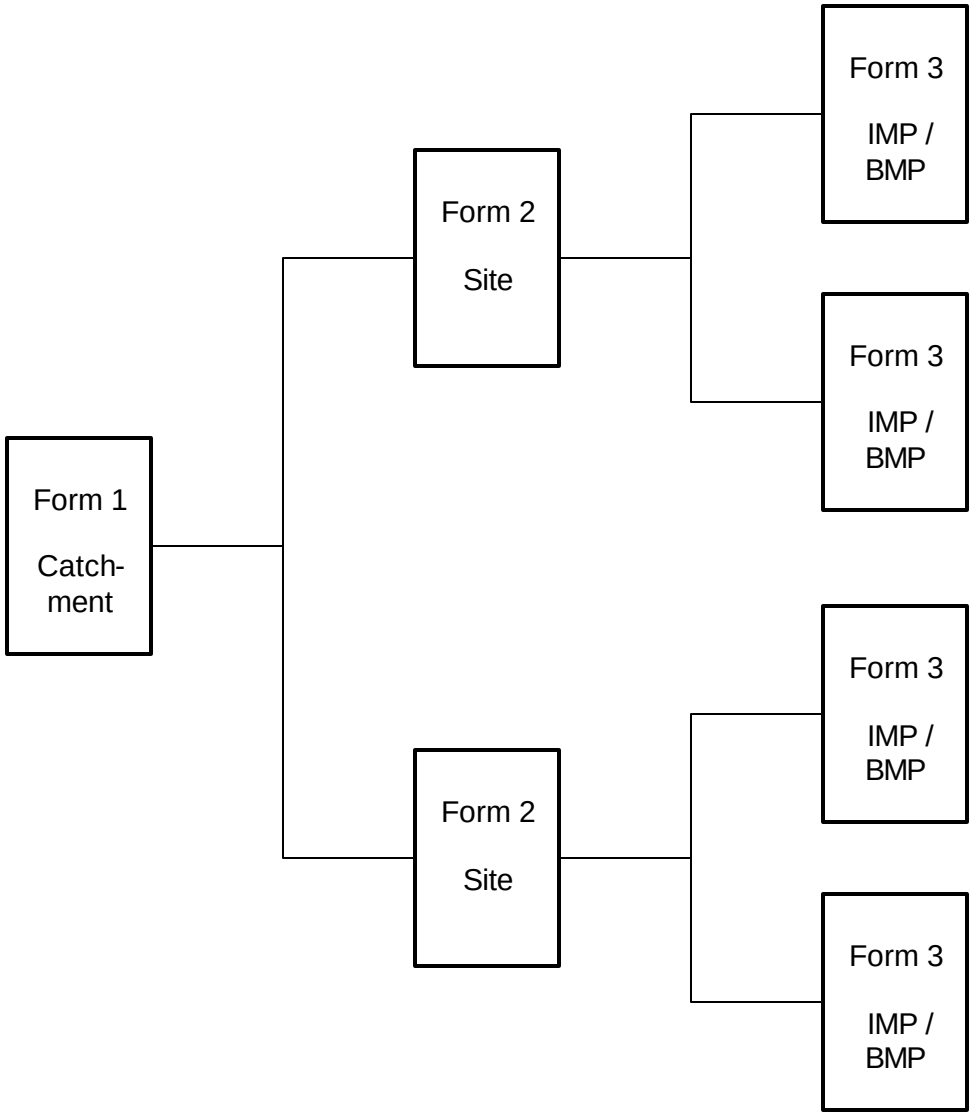
APPENDIX B

Data Collection Form Guidance

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
Data Collection Form Guidance

Forms 1 and 2 are used to assemble information relative to the catchment and site, respectively. These two forms are used to assemble information for the purpose of characterization and ranking of a site. For those sites that are determined to be suitable, Form 3 is used to evaluate the opportunities and constraints of potential management practices. The relationship between the three data collection forms is presented below.



Relationship Between the Three Data Collection Forms

The forms were developed to facilitate collection of data and subsequent analysis. The initial step is to select a property or parcel to be evaluated. Selection a single property or parcel will increase the chance that the features recorded on the forms are homogenous. The next step is to delineate a catchment so that it encompasses the property area. The outlet of the catchment should be a defined storm water conveyance such as a channel, storm drain inlet or storm water management facility. However, it is possible that no defined storm water conveyance may be present, especially in flat areas or areas that border streams. If there is no defined storm water conveyance, it may be necessary to

use an arbitrary catchment outlet. The catchment should encompass as much of the property as possible but not be so large that property represents a negligible portion of the catchment (assumed to be about five percent). Typically, catchments will range in size from 2 to 50 acres. The site is the portion of the property within the catchment. It is possible where one catchment contains two or more sites. It is also possible where one property is within two or more catchments. Each portion of the property within a catchment is to be considered a site.

General guidance that applies to all three forms follows. If the response to any question is unknown, record a response of "unknown." If a question is not applicable, leave the response blank. If more than one response applies, check all that apply. If the site is not homogeneous, provide a response that describes the majority of the catchment or site.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

Data Collection Form Guidance

FORM 1 – Catchment Information

Form 1 is used to collect catchment data for the purpose of characterization and ranking. This form will be populated from existing data sources.

1. Use two unique alpha characters to describe the subwatershed such as BB - Bear Branch, CB - Crows Branch, WB - Walker Branch, HB - Horsepen Branch, CB - Cox Branch, GB - Green Branch, SR - Stocketts Run or PR - Patuxent River. The two alpha characters are to be unique and are to be followed by a number starting with "one." When possible, the numbering should start at the top of the watershed and increase in the downstream direction.
2. Use a named stream such as Bear Branch, Crows Branch, Walker Branch, or Horsepen Branch in Prince George's County and Cox Branch, Green Branch and Stocketts Run in Anne Arundel County. However, any uniquely named stream can be used. The Patuxent River can also be considered a subwatershed for those adjacent catchments.
3. Locate the approximate center of the catchment and its position on the appropriate ADC map. The year of the map is important because the page numbers may change from year to year. The grid is an alpha character followed by a number (e.g., K4).
4. The coordinates of the catchment outfall is best obtained from the GIS to ensure the proper coordinate system is being used.
5. The road intersection is used to locate the outfall in the field.
6. Use the County's SDI (Storm Drain Inventory) ID for the outfall. If a SDI ID is not available, provide a description that can be used to locate the outfall in the field.
7. Circle either "demonstration" or "impairment". If an impairment, record the number (or numbers if more than one apply) of the impairments listed on Sheet 1.
8. Estimate the drainage area of the catchment.
9. Estimate the impervious area within the catchment.
10. The impervious area (Item #9) divided by the drainage area (Item #8).
11. The Soil Specific Recharge Factor (S) is described in Section 2.2 of the *2000 Maryland Stormwater Design Manual, Volume 1*. The soil recharge factor is related to the Hydrologic Soil Group (HSG) as follows: HSG "A" – 0.38, HSG "B" – 0.26, HSG "C" – 0.13, and HSG "D" – 0.07.
12. The Water Quality Volume (WQ_v) is described in Section 2.1 of the *2000 Maryland Stormwater Design Manual, Volume 1*. In Prince George's and Anne Arundel Counties, the water quality volume, in acre-feet, is determined from the following equation: $WQ_v = [(1.0)\ (R_v)\ (A)] / 12$. "A" is the area in acres and $R_v = 0.05 + 0.009(I)$, where "I" is the percent impervious cover.
13. The Recharge Volume Requirement (Re_v) is described in Section 2.2 of the *2000 Maryland Stormwater Design Manual, Volume 1*. The recharge volume, in acre-feet, is determined from the following equation: $Rev = [(S)\ (Rv)\ (A)] / 12$. "S" is the Soil Specific Recharge Factor, $R_v = 0.05 + 0.009(I)$, where "I" is the percent impervious cover, and "A" is the area in acres.
14. The predominant land use in the watershed. Use the descriptions in Table 2-2 in TR 55. These descriptions include open space, parking lot, commercial, residential (lots per acre), pasture, woods, etc.
15. The mean depth to ground water can be found in the soil survey. In Prince George's County, refer to the column in Table 7 entitled "Description of soil and site." In Anne Arundel County, refer to the columns in Table 7 entitled "Soil features that affect."

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
Data Collection Form Guidance
FORM 1 – Catchment Information

16. Indicate whether development within the catchment is served by a septic system (tank with a leaching field) or by a municipal sanitary sewer system.
17. Indicate whether the development within the catchment is served by an on site well or by a public supply.
18. Estimate the percentage of the storm drainage within the catchment that is piped. The remaining storm drainage can be either "altered" (e.g., manmade) or "natural" open channels. The piped and open channels must total 100 percent.
19. Estimate the area served by a storm drainage system. A storm drainage system is a drainage network that has been constructed to drain the developed area and consists of pipes and ditches. The storm drainage system eventually will discharge into a "natural" channel. The "natural" channel may be lined with concrete, riprap, gabions, etc.
20. Describe where within the catchment that is served by a storm drainage system.
21. Estimate the lining types of the open channels within the catchment. The four lining types must total 100 percent.
22. If a storm water management facility is present, indicate the Storm Drain Index (SDI) identification.
23. Indicate the BMP type listed on Sheets 4 and 5. Downstream regional facilities are included.
24. Estimate the age of the facility, if possible.
25. The road intersection is used to locate the BMP in the field.
26. Estimate the area of the catchment that is treated by the BMP. If the BMP is downstream of the catchment, then the BMP would treat the entire area of the catchment.
27. Calculate the percentage of the catchment that is treated by the BMP by dividing the area of the catchment that is treated by the BMP (Item #26) by the drainage area (Item #8). If the BMP is downstream of the catchment, then the BMP would treat 100 percent of the catchment.
28. Does the BMP in its existing configuration provide a water quality volume to meet current requirements (refer to the *2000 Maryland Stormwater Design Manual, Volume 1*)?
29. Does the BMP in its existing configuration provide a recharge volume to meet current requirements (refer to the *2000 Maryland Stormwater Design Manual, Volume 1*)?
30. Does the BMP in its existing configuration provide a channel protection volume to meet current requirements (refer to the *2000 Maryland Stormwater Design Manual, Volume 1*)?

Items #31 through #36 are a summation of all sites within the catchment. This summary cannot be completed until all sites within the catchment (Form 2) have been evaluated.

31. The water quality volume provided by the proposed LID IMPs or BMPs within the catchment.
32. The recharge volume provided by the proposed LID IMPs or BMPs within the catchment.
33. The total area treated by the proposed LID IMPs or BMPs within the catchment.
34. The impervious area treated by the proposed LID IMPs or BMPs within the catchment.
35. The area treated (Item #33) divided by the total catchment area (Item #8).
36. The impervious area treated (Item #34) divided by the total impervious area within the catchment (Item #9).
37. Record any comments

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
Data Collection Form Guidance
FORM 2– Site Information

Form 2 is used to collect site data for the purpose of characterization and ranking. The information will be collected primarily based on field inspection.

1. Use four alpha-numeric characters to describe the site on this form.
2. Use the alpha-numeric characters that describe the catchment on Form 1 in which the site is located.
3. Record the name of the site. The site name can be obtained from the GIS database.
4. Record the site address. The site address can be obtained from the GIS database.
5. Record the owner of the site. The owner of the site can be obtained from the GIS database.
6. The coordinates of the site centroid is best obtained from the GIS to ensure the proper coordinate system is being used.
7. Date of site visit.
8. Personnel present during site visit.
9. Weather conditions during the site visit (sky conditions, approximate temperature).
10. Estimate the area of the site.
11. Estimate the impervious area within the site.
12. The impervious area (Item #11) divided by the site area (Item #10).
13. The Soil Specific Recharge Factor (S) is described in Section 2.2 of the *2000 Maryland Stormwater Design Manual, Volume 1*. The soil recharge factor is related to the Hydrologic Soil Group (HSG) as follows: HSG "A" – 0.38, HSG "B" – 0.26, HSG "C" – 0.13, and HSG "D" – 0.07.
14. The Water Quality Volume (WQ_v) is described in Section 2.1 of the *2000 Maryland Stormwater Design Manual, Volume 1*. In Prince George's and Anne Arundel Counties, the water quality volume, in acre-feet, is determined from the following equation: $WQ_v = [(1.0) (R_v) (A)] / 12$. "A" is the area in acres and $R_v = 0.05 + 0.009(I)$, where "I" is the percent impervious cover.
15. The Recharge Volume Requirement (Re_v) is described in Section 2.2 of the *2000 Maryland Stormwater Design Manual, Volume 1*. The recharge volume, in acre-feet, is determined from the following equation: Rev = [(S) (Rv) (A)] / 12. "S" is the Soil Specific Recharge Factor, $R_v = 0.05 + 0.009(I)$, where "I" is the percent impervious cover, and "A" is the area in acres.
16. The area of the property in which the site is located.
17. The site area (Item #10) divided by the property area (Item #16).
18. The site area (Item #10) divided by the catchment area (Form 1, Item #8).
19. Estimate the percentage of the storm drainage within the site that is piped. The remaining storm drainage can be either "altered" (e.g., manmade) or "natural" open channels. The piped and open channels must total 100 percent.
20. Estimate the area served by a storm drainage system. A storm drainage system is a drainage network that has been constructed to drain the developed area and consists of pipes and ditches. The storm drainage system eventually will discharge into a "natural" channel. The "natural" channel may be lined with concrete, riprap, gabions, etc.
21. Estimate the lining types of the open channels within the site. The four lining types must total 100 percent.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
Data Collection Form Guidance
FORM 2– Site Information

Items #22 and #23 refer to BMPs located on site and do not include regional facilities. The LID IMPs and BMPs identified on Form 1 were obtained from the County's GIS database. It is possible that the County's GIS database is not comprehensive. Therefore, the field inspection may yield additional LID IMPs and BMPs. Record all LID IMPs and BMPs in Items #22 and #23.

22. Indicate the Storm Drain Index (SDI) identification. If the LID IMP / BMP has not been identified on Form 1, write "new." If the LID IMP / BMP is new, assign a number and record the number next to "new." On the site map, sketch the approximate location of the LID IMP / BMP and label using the assigned number. Identify the LID IMP / BMP from Sheets 4 & 5 and record next to the assigned number. An example of how a previously unidentified LID IMP / BMP is recorded is: New / 1 / 38.
23. Record the condition of the BMP. Consider the condition of the riser, emergency spillway, shoreline, plant material in and adjacent to the water, maintenance needs, and whether the pond is performing worse than envisioned. It may not be possible to assess the condition of some BMPs, especially those that are underground. If the condition of the BMP could not be assessed, leave this item blank.
24. Indicate the majority of the pavement type associated with the site.
25. Estimate the condition of the majority of the pavement associated with the site.
26. If IMPs / BMPs are proposed, could they easily be directed to the storm drains or drained by gravity (daylighted)?
27. Are downspouts present of the exterior of the structure? If there is no structure on site, leave this item blank.
28. Is the roof connected directly to a storm drain system (pipe or channel with impervious lining)? Generally, if the downspouts are on the interior of the structure, they can assumed to be connected directly to the storm drainage system.
29. Skip is the answer to Item #28 is yes. Is the roof connected directly to an impervious surface?
30. Drainage problems can include evidence of ponded water (on grassed or paved areas), channel erosion, erosion around storm drain inlets, etc.
31. Are steep slopes present on site? Steep slopes would preclude construction of many LID IMPs or BMPs. A slope is considered steep if it 3:1 (horizontal: vertical) or steeper.
32. Estimate the extent that the area is landscaped. Landscaping includes plantings other than grass.
33. Estimate the extent that the area is covered with mature trees. A mature tree will have a DBH (Diameter at Breast Height) greater than six inches.
34. Qualitatively estimate the area available for aboveground IMPs / BMPs.
35. Describe the existing cover of the potential aboveground IMP / BMP locations. Check all those that apply.
36. Are islands present in the parking lot?
37. Do curbs surround the islands?
38. Is the ground surface within the island above, equal to, or below the adjacent pavement?
39. Identify landscaping within the island. Check all those that apply.

40. If the areas adjacent to the parking lot have mature trees, is there adequate spacing between the trees to allow installation of aboveground IMPs / BMPs?
41. Without removing or adding to existing pavement, can the parking area be directed to flow towards pervious areas such as islands or an adjacent area? Cost-effective techniques to direct flow include speed bumps or trench drains. Inlets not adjacent to a pervious area (that is in the center of a parking lot) would be difficult to modify.

Items #42 through #47 are a summation of all potential LID IMPs or BMPs within the site. This summary cannot be completed until all potential management practices on the site (Form 3) have been evaluated.

42. The water quality volume provided by the proposed LID IMPs or BMPs within the site.
43. The recharge volume provided by the proposed LID IMPs or BMPs within the site.
44. The total area treated by the proposed LID IMPs or BMPs within the site.
45. The impervious area treated by the proposed LID IMPs or BMPs within the site.
46. The area treated (Item #44) divided by the total site area (Item #10).
47. The impervious area treated (Item #45) divided by the total impervious area within the site (Item #11).
48. Record the number of the photograph.
49. Provide a brief description of the photograph. Relevant features of the site should be photographed. Relevant features include buildings, parking areas, storm drainage conveyances, etc.
50. Record any comments.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

Data Collection Form Guidance

FORM 3 – Opportunities and Constraints of Potential Management Practice

Form 3 is a description of each recommended LID IMP (Low Impact Development Integrated Management Practice) or SWM BMP (Storm Water Management Best Management Practice) for the site identified on Form 2. There may be one or more IMP or BMP for each site. The information will be collected primarily based on field inspection.

1. Assign a number starting with "one."
2. Use four alpha-numeric characters to describe the site on Form 2.
3. Use the alpha-numeric characters that describe the catchment on Form 1 in which the site is located.
4. Check the appropriate response. New LID IMP (Low Impact Development Integrated Management Practice), SWM BMP Retrofit (Storm Water Management Best Management Practice), or new SWM BMP.
5. Indicate the BMP type listed on Sheets 4 and 5.
6. The coordinates of the site can be obtained when the LID IMP / SWM BMP has been entered into the GIS database. Obtaining the coordinates from the GIS database will ensure that the proper coordinate system is being used.
7. On the site plan, approximate the location of the drainage boundary to the LID IMP / SWM BMP. Identify any necessary modifications necessary to direct flow to the LID IMP / SWM BMP.
8. Record the number (or numbers if more than one apply) of the impairments listed on Form 1 addressed. Also include impairments listed on Sheets 6 and 7 that are addressed. Record "demonstration" if no impairments are being addressed.
9. This item identifies the ownership of the treatment area. It is possible that the treatment area may be off the site property.
10. Infrastructure includes utilities, septic systems including leaching fields, roadways, retaining walls, etc.
11. Will adjacent properties be impacted by the construction or operation of the treatment area? Impacts may include temporary flooding.
12. Is the treatment area readily accessible by construction equipment? Accessibility is affected by landscaping, utilities (including overhead clearance), proximity to structures, steep slopes, etc.
13. Is the treatment area readily accessible by maintenance equipment?
14. Permitting issues includes Waters of the United States, wetlands, floodplain, historic property, archeological sites, etc. Permitting issues can be identified in the field but a definitive determination will require additional investigation.
15. Are impacts to jurisdictional wetlands likely? These impacts may be temporary or permanent. Not all wetlands are jurisdictional. Check to see if any jurisdictional wetlands are present.
16. Is a forest retention area being impacted for construction, including access? A forest retention area is where a natural wooded area exists.
17. A conservation easement is an area that is designated to remain unaltered. Check to see if any conservation easements are present.
18. Identify utilities that are present on site. The site map, developed from the County's GIS database may not be comprehensive. Look for evidence of manholes, valve boxes, meters,

transformers, telephone or cable distribution boxes, well casings, etc. Septic systems including leaching fields may not be readily apparent.

19. If information is available, identify all utilities that could be affected by construction of the proposed treatment area.
20. If no utilities are impacted, leave this blank. If both above ground and underground utilities area affected, check both.
21. If the proposed treatment area is close to a stream, it may be located in a critical area. The Chesapeake Bay Critical Area Protection Program requires the establishment, preservation, and maintenance of a 100-foot, naturally vegetated, forested buffer landward from the edge of tributary streams. Check the delineated boundary.
22. Will mature / specimen trees be affected by construction, including access? A mature tree will have a DBH (Diameter at Breast Height) greater than six inches.
23. Will existing landscaping be affected by construction, including access?
24. Are underdrains needed for the IMP / BMP to function properly?
25. If underdrains are not needed, leave this item blank. If underdrains are needed, can they be daylighted or discharged to an existing storm drain?
26. Verify the soil suitability of the proposed IMP / BMP as described on Sheets 8 and 9.
27. Verify the suitability of the ground water level for proposed IMP / BMP as described on Sheets 8 and 9.
28. If the IMP / BMP receives flow from off site area, estimate the drainage included in the site as described on Form 2. If the IMP / BMP does not receive flow from off site area, the area will equal the area treated (Item #42).
29. The area treated from the site (Item #28) divided by the total area treated (Item #42).
30. Record the SDI ID from Forms 1 and 2.
31. Does the SWM BMP retrofit include addition of a forebay?
32. Does the SWM BMP retrofit include modification of the outlet structure? Modifications will affect the hydraulic performance and could include changing elevations of weir crests or orifices, weir length, orifice size, addition or removal of weirs and orifices. Modifications do not include changes to the trash rack, apron, dewatering devices, etc.
33. Does the SWM BMP retrofit include addition or modification of an aquatic bench? Modification includes changes to the width or depth. Modification does not include changes to vegetation.
34. Does the SWM BMP retrofit include modification to the bottom of the facility? Typical modification will include excavation of a sump or other grading activities to create a permanent wet area. Modification does not include changes to vegetation.
35. Does the SWM BMP retrofit include planting of native vegetation?
36. Does the SWM BMP retrofit include providing additional storage volume?
37. If the response to Item #36 is yes, will the additional storage volume be obtained through excavation, by raising the embankment, or a combination (check both responses)?
38. The water quality volume provided by the proposed LID IMP or BMP.

39. The recharge volume provided by the proposed LID IMP or BMP.
40. The total area treated by the proposed LID IMP or BMP.
41. The impervious area treated by the proposed LID IMP or BMP.
42. Record the number of the photograph.
43. Provide a brief description of the photograph. Relevant features of the site should be photographed. Relevant features include buildings, parking areas, storm drainage conveyances, access to the treatment area, etc.
44. Record any comments.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

	Impairment
1	Channel protection
2	Ground water recharge
3	Flooding
4	Water quality
5	TMDL
6	Channel Alteration
7	Stream bank erosion
8	Exposed pipes
9	Pipe outfalls
10	Fish barrier
11	Inadequate Buffer
12	In / Near stream construction
13	Trash dumping
14	Trash floatables
15	Protection of existing waters (wetlands, streams)
16	Habitat
17	Invasive plant species (6 listed by State)
18	Citizen complaints
19	Other

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

	Assessment	Responsibility	
		Primary	Secondary
1	Sidewalks present	Field	GIS
2	Curb & gutter present	Field	NA
3	Street width	Field	GIS
4	Age / Condition of Street	County	Field
5	Storm drain system present	Field	GIS
6	Gutter / downspouts	Field	NA
7	Connected roof area	Field	NA
8	Impervious driveway	Field	NA
9	Right of way along roadway is available	County	GIS
10	Underground utilities	GIS	Field
11	Overhead utilities	Field	GIS
12	Septic	County	GIS
13	Wells	County	GIS
14	Mature / specimen trees	Field	County
15	Extensive landscaping	Field	NA
16	Steep slope	Field	GIS
17	Overhead utility right of way is available	GIS	Field
18	Below ground utility right of way is available	GIS	Field
19	Forest retention area	County	GIS
20	Critical area designation	County	GIS
21	Transportation setback requirements	County	NA
22	Setback requirements for buildings	County	NA
23	Existing SWM / BMPs (type, age)	County	GIS

	Applicability
1	Residential
2	Commercial
3	Industrial
4	Roadways
5	Parking lots
6	For all soil types
7	Requires well-drained soil
8	Independent of water table
9	Requires a high water table
10	Requires a low water table
11	Independent of drainage area size
12	Limited to small drainage areas
13	Limited to large drainage areas
14	Can be used on slopes
15	Can be used where space is limited
16	Low maintenance
17	Conducive for routine maintenance / snow removal
18	Community Acceptance
19	Construction Cost
20	Habitat Quality
21	Minimal permitting issues
22	Consistent with building code
23	Non-hazardous environment for children
24	Does not promote mosquito breeding

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

ID	BMP Type	County Code	State Code	Comment
1	LID-Street Narrowing (8)			Street widths must meet code. Assumed construction will occur during routine replacement.
2	LID-Parking Area Conversion (20)			In conjunction with street narrowing, on street parking is porous / pervious materials.
3	LID-Reduced Sidewalk Imperviousness (12)			Sidewalk must meet code. Assumed construction will occur during routine replacement.
4	LID-Pedestal Sidewalks (28)			Storage provided below supported slabs
5	LID-Rainwater Capture and Use (30)			Rain barrels (above ground) and cisterns (below ground)
6	LID-Roof Top Detention (32)			Maximum roof load is 30 psf[6]
7	LID-Green Roofs (36)			Soil retains and filters water. Plants use and transpire water.
8	LID-Yard Storage (34)			Area off an open conveyance that is used to store (not infiltrate) water.
9	LID-Rain Gardens (74)			Surface depression storage. Similar to bioretention without the soil amendments.
10	LID-Subsurface Storage (38)	UGS		Confined vaults that store but do not exfiltrate.
11	LID-Inlet Restriction (40)			Temporarily stores runoff in unused areas of parking lot.
12	LID-Curb Storage (42)			Similar to infiltration trench but installed in parking lots. Has underdrain.
13	Detention Structure (Dry Pond)	DP		
14	Extended Detention Structure-Dry	EDSD		
15	Micropool Extended Detention Pond[1]		P-1	Micropool prevents clogging of low-flow orifice and sediment resuspension
16	Retention Pond (Wet Pond)[1]	WP	P-2	Water quality volume in a permanent pool
17	LID-Fish Pond (76)			Identical to a wet pond but can be smaller. Provides no water quality benefits.
18	Wet Extended Detention Structure[1]	EDSW	P-3	Water quality volume in a permanent pool & extended detention
19	Multiple Pond[1]		P-4	Water quality volume in permanent pools with longer flow paths
20	Pocket Pond		P-5	Micropool level is maintained by ground water
21	Shallow Marsh / Wetland[2]	SM	W-1	Water quality volume in shallow pool
22	Extended Detention Wetland[2]		W-2	Combination of wetland and extended detention
23	Pond / Wetland[2]		W-3	Deep permanent pool upstream of wetland
24	Pocket Wetland		W-4	Wetland pool level is maintained by ground water
25	LID-Infiltration Trench (86) (Complete Exfiltration)[3]	ITCE	I-1	Provides ground water recharge and water quality volume
26	Infiltration Basin[3]	IB	I-2	Larger basin where water quality volume percolates in 2 days
27	LID-Grated Infiltration System (14)			Replace pavement with grates that cover a granular drainage material.
28	LID-Porous Pavement (16)	PP		Assumed construction will occur during routine replacment.
29	LID-Below-Pavement Infiltration Basin (88)			Stone installed below porous pavement
30	LID-Parking Grove (22)			Parking lots, parking area only is porous / pervious materials.
31	LID-Landscaped Traffic Calming Features (18)			Replace pavement with porous / pervious materials
32	LID-Exfiltration Devices / Dry Wells (90)	DW		
33	Sand Filter[4] (surface)	SF	F-1	Treats the largest drainage area
34	Underground Sand Filter[4]		F-2	Contained in vault, receives pipe flow
35	Perimeter Sand Filter[4]		F-3	Contained in vault, receives sheet flow
36	Organic Filter[4]		F-4	Similar to sand filter except that it maximizes the removal of nutrients and trace metals
37	Pocket Sand Filter[4]		F-5	Used for small sites with low sediment loads
38	LID-Bioretention[4] (60) / Underdrained (68)		F-6	Surrounded by pervious area. Most include an underdrain.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

ID	BMP Type	County Code	State Code	Comment
39	LID-Bioretention Islands (62)			Surrounded by pavement. Located in a parking lot.
40	LID-Linear Bioretention (64)			Conveyance in parking lots.
41	Filterra™ Storm Water Bioretention Filtration System			Self-contained unit that treats 0.25 ac per unit. http://www.americastusa.com/filterra.html
42	LID-Concave Street Medians (10)			Similar to Linear Bioretention & Bioretention Islands
43	LID-Bioretention Bench (66)			On slope (weeping walls).
44	LID-Slope Reduction Bench (70)			Landscaping without bioretention.
45	LID-Dripline Planter Box (78)			In essence, foundation plantings.
46	LID-Grassed Channel (46)			Conveyance lined with grass. Serves small drainage area. Does not replace storm drain.
47	LID-Grass Channel With Underdrain (48)			Identical to grassed-lined channel except that it has an underdrain.
48	LID-Exfiltration Grassed Channel (50)			Grassed channel with an inlet that directs flow to an infiltration trench under the channel
49	LID-Infiltration Trench Grassed Channel / Dry Swale[5] (54)	SW	O-1	Conveyance. Alternative to infiltration trenches.
50	LID-Bioretention Channel[5] (52)		O-2	Conveyance along roads.
51	LID-Disconnection of Impervious Areas (56)			Can also include spreading out concentrated flow over pervious surface.
52	LID-Native Groundcover Landscaping (80)			Conversion from turf to native ground covers, shrubs and trees. Use may be restricted.
53	Oil/Grit Separator	OGS		
54	Stream Restoration			
55	Pollution Prevention (trash / dumping)			
56	Eradication / Program changes / Mowing			
57	Public Education / Outreach / Participation			
58	Stenciling			
59	Soil Amendments			Can be covered with sod or native vegetation.
60	LID-Grid Pavers (24)			
61	LID-Filter Strips (72)			Not a stand alone technique
62	LID-Green Alleys (82)			Too broad to be considered. Linear network of IMPs.
63	Infiltration Trench-Partial Exfiltration	ITPE		
64	Infiltration Trench-Water Quality Exfiltration	TWQE		
65	Unknown / Other			Not a recommendation

1 - Contributing drainage area must be 10 acres or greater (25 acres preferred minimum)

2 - A hydrologic budget must be performed to demonstrate adequate water supply

3 - Must have an infiltration rate greater than 0.52 in/hr. Clay content must be less than 20%, silt / clay less than 40%. Must be minimum of 4 ft above seasonally high ground water level.

4 - Requires 2 to 6 ft of head. Drainage area should be less than 10 acres.

5 - Used primarily along roads. Must have grades less than 4%. Velocity for 10-year event must be non-erosive. Ponding time should be 30 minutes (min) to 48 hrs (max).

6 - With a maximum roof load of 30 psf, the maximum depth of water is 0.48 ft = 5.77 in. Most roofs have a pitch of 1/4 in. per foot so the maximum distance between a roof drain and a secondary discharge point is 23.1 ft. The volume provided is 1/3 x (23.1 x 2)^2 x).48 = 342 cu ft. The weir around the drain inlet must be routinely maintained to prevent standing water. Structural engineers do not recommend rooftop detention without detailed analysis.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

		Design Manual					Stream Corridor Assessment										Habitat				
	BMP Type	Channel Protection -- 1	Ground Water Recharge -- 2	Flooding -- 3	Water Quality -- 4	TMDL -- 5	Channel Alteration -- 6	Stream Bank Erosion -- 7	Exposed Pipes -- 8	Pipe Outfalls -- 9	Fish Barrier -- 10	Inadequate Buffer -- 11	In / Near Stream Construction -- 12	Trash Dumping -- 13	Trash Floatables -- 14	Protection of Existing Waters -- 15	Benthic -- 16	Aquatic -- 16	Riparian --16	Invasive Species -- 17	Citizen Complaints -- 18
1	LID-Street Narrowing (8)	CN	Rv		Rv			✓									✓	✓			
2	LID-Parking Area Conversion (20)	CN	Rv		Rv			✓									✓	✓			
3	LID-Reduced Sidewalk Imperviousness (12)	CN	Rv		Rv			✓									✓	✓			
4	LID-Pedestal Sidewalks (28)	ST						✓									✓				
5	LID-Rainwater Capture and Use (30)	ST						✓									✓				
6	LID-Roof Top Detention (32)	ST						✓									✓				
7	LID-Green Roofs (36)	ST			WQ			✓									✓				
8	LID-Yard Storage (34)	ST						✓									✓				
9	LID-Rain Gardens (74)	ST						✓									✓				
10	LID-Subsurface Storage (38)	ST						✓									✓				
11	LID-Inlet Restriction (40)	ST						✓									✓				
12	LID-Curb Storage (42)	ST						✓									✓				
13	Detention Structure (Dry Pond)	ST		ST				✓									✓				
14	Extended Detention Structure-Dry	ST		ST	WQ			✓									✓				
15	Micropool Extended Detention Pond [P-1]	✓		✓	✓			✓									✓				
16	Retention Pond (Wet Pond) [P-2]	✓		✓	✓			✓									✓				
17	LID-Fish Pond (76)	ST						✓									✓				
18	Wet Extended Detention Structure [P-3]	✓		✓	✓			✓									✓				
19	Multiple Pond [P-4]	✓		✓	✓			✓									✓				
20	Pocket Pond [P-5]	✓		✓	✓			✓									✓				
21	Shallow Marsh / Wetland [W-1]	✓		✓	✓			✓									✓				
22	Extended Detention Wetland [W-2]	✓		✓	✓			✓									✓				
23	Pond / Wetland [W-3]	✓		✓	✓			✓									✓				
24	Pocket Wetland [W-4]	Var		Var	✓			✓									✓				
25	LID-Infiltration Trench (86) [I-1]	Var	✓	Var	✓			✓									✓	✓			
26	Infiltration Basin [I-2]	Var	✓	Var	✓			✓									✓	✓			
27	LID-Grated Infiltration System (14)		✓		✓													✓			
28	LID-Porous Pavement (16)		✓		✓													✓			
29	LID-Below-Pavement Infiltration Basin (88)		✓		✓													✓			
30	LID-Parking Grove (22)		✓		✓													✓			
31	LID-Landscaped Traffic Calming Features (18)		✓		✓													✓			
32	LID-Exfiltration Devices / Dry Wells (90)		✓		✓													✓			
33	Sand Filter (surface) [F-1]	Var	Var	Var	✓			✓									✓	✓			
34	Underground Sand Filter [F-2]				✓																
35	Perimeter Sand Filter [F-3]				✓																
36	Organic Filter [F-4]	Var	Var	Var	✓			✓									✓	✓			
37	Pocket Sand Filter [F-5]	Var	Var	Var	✓			✓									✓	✓			
38	LID-Bioretention (60) / Underdrained (68) [F-6]	Var	Var	Var	✓			✓									✓	✓			
39	LID-Bioretention Islands (62)	Var	Var	Var	✓			✓									✓	✓			
40	LID-Linear Bioretention (64)	Var	Var	Var	✓			✓									✓	✓			

Depends on TMDL Parameter(s)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

		Design Manual				TMDL -- 5	Stream Corridor Assessment								Trash Floatables -- 14	Protection of Existing Waters -- 15	Habitat			Invasive Species -- 17	Citizen Complaints -- 18
	BMP Type	Channel Protection -- 1	Ground Water Recharge -- 2	Flooding -- 3	Water Quality -- 4		Channel Alteration -- 6	Stream Bank Erosion -- 7	Exposed Pipes -- 8	Pipe Outfalls -- 9	Fish Barrier -- 10	Inadequate Buffer -- 11	In / Near Stream Construction -- 12	Trash Dumping -- 13			Benthic -- 16	Aquatic -- 16	Riparian --16		
41	Filterra[TM] Storm Water Bioretention Filtration System				WQ[1]																
42	LID-Concave Street Medians (10)	Var	Var	Var	✓			✓									✓	✓			
43	LID-Bioretention Bench (66)	ST	IN		WQ			✓									✓	✓			
44	LID-Slope Reduction Bench (70)	Tc						✓									✓				
45	LID-Dripline Planter Box (78)	ST						✓									✓				
46	LID-Grassed Channel (46)	Tc						✓									✓				
47	LID-Grass Channel With Underdrain (48)	Tc						✓									✓				
48	LID-Exfiltration Grassed Channel (50)	Tc	IN					✓									✓	✓			
49	LID-Infiltration Trench Grassed Channel / Dry Swale (54) [O-1]	Tc	✓		✓			✓									✓	✓			
50	LID-Bioretention Channel (52) [O-2]	ST			✓			✓									✓				
51	LID-Disconnection of Impervious Areas (56)	CN/Tc[1]		CN/Tc[1]	Rv[1]			✓									✓				
52	LID-Native Groundcover Landscaping (80)	CN[1]		CN[1]				✓									✓				
53	Oil/Grit Separator				WQ																
54	Stream Restoration				WQ		✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	
55	Pollution Prevention (trash / dumping)				WQ									✓	✓						
56	Eradication / Program changes / Mowing																		✓	✓	
57	Public Education / Outreach / Participation				WQ									✓	✓				✓	✓	
58	Stenciling of Storm Drain Inlets				WQ																
59	Soil Amendments	CN		CN				✓									✓				
60	LID-Grid Pavers (24)	CN		CN				✓									✓				

The *2000 Maryland Stormwater Design Manual* provides definitive guidance for credits allowed for channel protection (Cp_v), ground water recharge (Re_v), flooding (Qp) and water quality (WQ_v). The following key should be used.

- ✓ As described in Table 4.3, a check indicates that the BMP, when properly designed and constructed, will achieve the desired treatment.
- Var As described in Table 4.3, "Var" indicates that the BMP, when properly designed and constructed, may achieve the desired treatment.
- CN Curve number reduction will result in a lower runoff volume and peak flow rate. The reduction can be quantified using TR-55 or TR-20.
- ST Storing runoff will result in a lower peak flow rate. The reduction of the peak flow rate can be quantified by using the "STRUCT" routine in TR-20.
- Tc An increase in the time of concentration will result in a lower peak flow rate. The reduction can be quantified using TR-55 or TR-20.
- Rv A reduction of impervious area will result in a change in the Rv parameter, which relates directly to WQ_v and Re_v.
- IN These practices will increase infiltration but the increase cannot be easily quantified.
- WQ These practices will improve water quality but the improvement cannot be easily quantified.
- WQ^1 The manufacturer provides water quality design guidance.

Improvements for benthic habitat are tied to decreased sediment loading associated with channel protection.
Improvements for aquatic habitat are tied to increased base flow associated with ground water recharge.

1 - Credits are enumerated in Table 5.1.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

	BMP Type	Development Type[1]					Soils[2]		Water Table[3]			Drainage Area[4]			Slope[5]		Can be Used Where Space is Limited[6]	Maintenance[7]			Acceptance[8]			Non-Hazardous Environment for Children[9]	May Promote Mosquito Breeding[10]	Habitat Quality[11]			Minimal Environmental Permitting Issues[12]	Consistent with Building Code[13]	Cost[14]		
		Residential	Commercial	Industrial	Roadways	Parking Lots	For All Soil Types	Requires Well-Drained Soil	Independent of Water Table or Underdrain	Requires High Water Table	Requires Low Water Table or Underdrains	Independent of Drainage Area Size	Limited to Small Drainage Areas	Limited to Large Drainage Areas	Can be Used on Mild Slopes	Can be Used on Steep Slopes		Low / Easy Maintenance	Medium Maintenance	High / Difficult Maintenance	High Community Acceptance	Medium Community Acceptance	Low Community Acceptance			Low	Medium	High			Low	Medium	High
1	LID-Street Narrowing (8)				✓		✓		✓			✓			✓		✓	✓						✓		✓			✓	?		✓	
2	LID-Parking Area Conversion (20)				✓			✓	✓			✓			✓		✓	✓			✓			✓		✓			✓			✓	
3	LID-Reduced Sidewalk Imperviousness (12)	✓	✓	✓			✓		✓			✓			✓		✓	✓				✓		✓		✓			✓	?	✓		
4	LID-Pedestal Sidewalks (28)		✓				✓		✓			✓			✓		✓			✓	✓			✓		✓			✓	✓			✓
5	LID-Rainwater Capture and Use (30)	✓					✓		✓				✓		✓		✓		✓			✓		✓	✓	✓			✓	✓	✓		
6	LID-Roof Top Detention (32)		✓	✓			✓		✓				✓		✓		✓		✓				✓	✓		✓			✓	?			✓
7	LID-Green Roofs (36)		✓	✓			✓		✓				✓		✓		✓			✓			✓	✓		✓			✓	?			✓
8	LID-Yard Storage (34)	✓					✓		✓				✓		✓		✓	✓				✓		✓	✓	✓			✓	✓	✓		
9	LID-Rain Gardens (74)	✓						✓			✓		✓		✓		✓	✓				✓		✓	✓	✓			✓	✓	✓		
10	LID-Subsurface Storage (38)		✓	✓			✓		✓				✓		✓		✓		✓		✓			✓		✓			✓	✓			✓
11	LID-Inlet Restriction (40)					✓	✓		✓				✓		✓		✓	✓				✓		✓		✓			✓	✓	✓		
12	LID-Curb Storage (42)					✓	✓		✓				✓		✓		✓	✓			✓			✓		✓			✓	✓		✓	
13	Detention Structure (Dry Pond)	✓	✓	✓	✓	✓	✓		✓			✓			✓				✓			✓		✓			✓				✓	
14	Extended Detention Structure-Dry	✓	✓	✓	✓	✓	✓		✓			✓			✓				✓			✓		✓				✓			✓	
15	Micropool Extended Detention Pond [P-1]	✓	✓	✓	✓	✓	✓				✓			✓	✓				✓			✓					✓			✓		✓
16	Retention Pond (Wet Pond) [P-2]	✓	✓	✓	✓	✓	✓				✓			✓	✓			✓			✓							✓		✓		✓
17	LID-Fish Pond (76)	✓					✓		✓				✓		✓		✓	✓		✓	✓					✓			✓	✓	✓		
18	Wet Extended Detention Structure [P-3]	✓	✓	✓	✓	✓	✓				✓			✓	✓				✓		✓							✓		✓		✓
19	Multiple Pond [P-4]	✓	✓	✓	✓	✓	✓				✓			✓	✓				✓		✓							✓		✓		
20	Pocket Pond [P-5]	✓	✓	✓	✓	✓	✓			✓			✓		✓			✓	✓			✓				✓			✓	✓			✓
21	Shallow Marsh / Wetland [W-1]	✓	✓	✓	✓	✓	✓				✓			✓	✓					✓	✓							✓		✓		
22	Extended Detention Wetland [W-2]	✓	✓	✓	✓	✓	✓				✓			✓	✓					✓		✓						✓		✓		
23	Pond / Wetland [W-3]	✓	✓	✓	✓	✓	✓				✓			✓	✓					✓	✓							✓		✓		✓
24	Pocket Wetland [W-4]	✓	✓	✓	✓	✓	✓			✓	✓		✓		✓			✓		✓				✓				✓		✓	✓		✓
25	LID-Infiltration Trench (86) [I-1]	✓	✓	✓	✓	✓		✓			✓		✓		✓		✓			✓	✓			✓		✓			✓	✓		✓	
26	Infiltration Basin [I-2]	✓	✓	✓	✓	✓		✓			✓		✓		✓				✓				✓	✓		✓			✓	✓		✓	
27	LID-Grated Infiltration System (14)		✓	✓			✓				✓		✓		✓		✓		✓		✓			✓		✓			✓	✓	✓		
28	LID-Porous Pavement (16)					✓	✓				✓	✓			✓		✓		✓		✓			✓		✓			✓	?	✓		
29	LID-Below-Pavement Infiltration Basin (88)					✓	✓				✓	✓			✓		✓		✓		✓			✓		✓			✓	✓	✓		
30	LID-Parking Grove (22)					✓	✓				✓	✓			✓		✓			✓	✓			✓		✓			✓	✓		✓	
31	LID-Landscaped Traffic Calming Features (18)				✓		✓				✓		✓		✓		✓			✓		✓		✓		✓			✓	?			✓
32	LID-Exfiltration Devices / Dry Wells (90)	✓	✓	✓				✓			✓		✓		✓		✓			✓	✓			✓		✓			✓	?		✓	
33	Sand Filter (surface) [F-1]	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓		✓			✓		✓		✓			✓	✓	✓		
34	Underground Sand Filter [F-2]	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓			✓	✓			✓		✓			✓	✓	✓		
35	Perimeter Sand Filter [F-3]	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓			✓	✓			✓		✓			✓	✓	✓		
36	Organic Filter [F-4]	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓		✓		✓			✓		✓			✓	✓	✓		
37	Pocket Sand Filter [F-5]	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓		✓			✓		✓		✓			✓	✓		✓	
38	LID-Bioretention (60) / Underdrained (68) [F-6]	✓	✓	✓				✓			✓		✓		✓		✓		✓			✓		✓					✓	✓		✓	
39	LID-Bioretention Islands (62)					✓		✓			✓		✓		✓		✓		✓		✓			✓		✓			✓	✓		✓	
40	LID-Linear Bioretention (64)					✓		✓			✓		✓		✓		✓		✓		✓			✓		✓			✓	✓		✓	

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

		Development Type[1]					Soils[2]		Water Table[3]			Drainage Area[4]			Slope[5]		Can be Used Where Space is Limited[6]	Maintenance[7]			Acceptance[8]			Non-Hazardous Environment for Children[9]	May Promote Mosquito Breeding[10]	Habitat Quality[11]			Minimal Environmental Permitting Issues[12]	Consistent with Building Code[13]	Cost[14]		
	BMP Type	Residential	Commercial	Industrial	Roadways	Parking Lots	For All Soil Types	Requires Well-Drained Soil	Independent of Water Table or Underdrain	Requires High Water Table	Requires Low Water Table or Underdrains	Independent of Drainage Area Size	Limited to Small Drainage Areas	Limited to Large Drainage Areas	Can be Used on Mild Slopes	Can be Used on Steep Slopes		Low / Easy Maintenance	Medium Maintenance	High / Difficult Maintenance	High Community Acceptance	Medium Community Acceptance	Low Community Acceptance			Low	Medium	High			Low	Medium	High
41	Filterra[TM] Storm Water Bioretention Filtration System	✓	✓	✓	✓	✓	✓				✓		✓		✓	✓	✓	✓			✓			✓		✓			✓	✓		✓	
42	LID-Concave Street Medians (10)				✓			✓			✓		✓		✓				✓		✓			✓		✓			✓	?			✓
43	LID-Bioretention Bench (66)	✓	✓	✓				✓			✓		✓			✓	✓		✓		✓			✓		✓			✓	✓		✓	
44	LID-Slope Reduction Bench (70)	✓	✓	✓			✓		✓			✓				✓	✓	✓			✓			✓		✓			✓	✓		✓	
45	LID-Dripline Planter Box (78)	✓	✓	✓				✓	✓				✓		✓		✓		✓			✓		✓		✓			✓	✓		✓	
46	LID-Grassed Channel (46)	✓	✓	✓	✓	✓	✓		✓				✓		✓		✓	✓			✓			✓		✓			✓	✓	✓		
47	LID-Grass Channel With Underdrain (48)	✓	✓	✓	✓	✓	✓				✓		✓		✓		✓		✓		✓			✓		✓			✓	✓			✓
48	LID-Exfiltration Grassed Channel (50)	✓	✓	✓	✓	✓		✓			✓		✓		✓		✓		✓		✓			✓		✓			✓	✓			✓
49	LID-Infiltration Trench Grassed Channel / Dry Swale (54) [O-1]	✓	✓	✓	✓	✓		✓			✓		✓		✓		✓	✓			✓			✓		✓			✓	✓		✓	
50	LID-Bioretention Channel (52) [O-2]	✓	✓	✓	✓	✓	✓			✓			✓		✓			✓			✓				✓	✓			✓	✓			✓
51	LID-Disconnection of Impervious Areas (56)	✓	✓	✓	✓	✓	✓		✓				✓		✓		✓	✓				✓		✓		✓			✓	✓	✓		
52	LID-Native Groundcover Landscaping (80)	✓	✓	✓			✓		✓			✓			✓		✓	✓				✓		✓		✓			✓	?			
53	Oil/Grit Separator		✓	✓		✓	✓		✓				✓		✓		✓			✓		✓		✓		✓			✓	✓			✓
54	Stream Restoration						✓		✓			✓			✓		✓	✓			✓			✓				✓	✓	✓		✓	
55	Pollution Prevention (trash / dumping)																				✓										✓		
56	Eradication / Program changes / Mowing																				✓										✓		
57	Public Education / Outreach / Participation																				✓										✓		
58	Stenciling of Storm Drain Inlets																	✓			✓										✓		
59	Soil Amendments	✓	✓	✓			✓		✓			✓			✓		✓	✓				✓		✓			✓		✓	?			
60	LID-Grid Pavers (24)	✓	✓	✓		✓	✓		✓			✓			✓	✓	✓	✓			✓			✓		✓			✓	✓		✓	

1 - Certain type of BMPs are limited to a specific development type. If no check is provided then the BMP is not affilitated with any specific type of development.
2 - Some BMPs require soils to either be well drained or provided with underdrains. Other BMPs may require liners be used if the soils are too pervious.
3 - BMPs may require that the seasonally-high water table be low for infiltration or high to ensure a permanent pool.
4 - Large drainage areas are required to ensure an adequate supply of water to maintain a permanent pool. Other BMPs can only treat a small drainage area.
5 - Although most BMPs can be installed on mild slopes but not steep slopes, some BMPs have a minimum head requirement. Few BMPs required the presence of a steep slope.
6 - Those BMPs that do not require and occupy a large area are identified.
7 - This factor includes the ease of maintenance, frequency of scheduled maintenance, maintenance problems, operational issues (such as snow removal) and failure rates.
8 - Community acceptance is measured by the following factors: market and preference surveys, reported nuisance problems and visual aesthetics.
9 - A hazardous environment includes permanently ponded water.
10 - It is assumed that a facility with a permanent pool will support an ecosystem where mosquito breeding is not problematic. Ponded water associated with failed infiltration systems is not included.
11 - Wildlife and wetland habitat can be provided by a BMP. It is assumed that the area must be large enough to support wildlife.
12 - Environmental issues can preclude development of a facility, especially if it impacts wetlands or waters of the United States.
13 - Building codes may preclude construction.
14 - Construction / implementation cost is relative to impervious acre treated.

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
FORM 1 -- Catchment Information

Subwatershed: (2)

Location of Catchment Centroid on ADC Map: Year: (3) Page: (3) Grid: (3)

State Plane Coordinates of Outfall Location: (4)

Closest Road Intersection to Outfall: (5)

Outfall SDI ID or Outfall Description: (6)

Objective: Demonstration / Impairment(s) (Sheet 1) (7)

Drainage Area (ac): (8) Impervious Area (ac): (9)

Percent Impervious: (10) Soil Recharge Factor (S): (11)

WQ_v (required): (12) Re_v (required): (13)

Predominant Land Use: (14) Mean Depth to Ground Water: (15)

Sanitary System: ☐ Septic ☐ Municipal Sewer (16) Water Supply: ☐ On Site Well ☐ Public Water (17)

Storm Drainage System Within Catchment

Piped: (18) % Open Channels: (18) %

Area Drained by System: (19) %

Location in Catchment: ☐ Headwaters ☐ Middle ☐ Lower ☐ All (20)

Open Channel Lining- Vegetation: (21) % Riprap: (21) % Concrete: (21) % Other: (21) %

Existing IMP(s) / BMP(s)

SDI ID: (22) Type (number from Sheets 4 & 5): (23) Age: (24)

Closest Road Intersection to IMP / BMP: (25)

Catchment Area Treated (ac) : (26) Percentage Catchment Treated: (27)

WQ_v Provided: ☐ YES ☐ NO (28) Re_v Provided: ☐ YES ☐ NO (29) C_p Provided: ☐ YES ☐ NO (30)

SDI ID: (22) Type (number from Sheets 4 & 5): (23) Age: (24)

Closest Road Intersection to IMP / BMP: (25)

Catchment Area Treated (ac) : (26) Percentage Catchment Treated: (27)

WQ_v Provided: ☐ YES ☐ NO (28) Re_v Provided: ☐ YES ☐ NO (29) C_p Provided: ☐ YES ☐ NO (30)

SDI ID: (22) Type (number from Sheets 4 & 5): (23) Age: (24)

Closest Road Intersection to IMP / BMP: (25)

Catchment Area Treated (ac) : (26) Percentage Catchment Treated: (27)

WQ_v Provided: ☐ YES ☐ NO (28) Re_v Provided: ☐ YES ☐ NO (29) C_p Provided: ☐ YES ☐ NO (30)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)

FORM 1 -- Catchment Information (concluded)

CATCHMENT SUMMARY			
WQ_v (provided):	(31)	Re_v (provided) :	(32)
Area Treated (ac):	(33)	Impervious Area Treated (ac):	(34)
Area Treated (%):	(35)	Impervious Area Treated (%):	(36)

Comments (37)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
FORM 2 -- Site Information

Site Name: (3) Address: (4)

Site Owner: (5)

State Plane Coordinates of Site Centroid: (6) Date: (7)

Personnel: (8) Weather: (9)

Area (ac): (10) Impervious Area (ac): (11)

Percent Impervious: (12) Soil Recharge Factor (S): (13)

WQ_v (required): (14) Re_v (required): (15)

Property Area (ac): (16) Property Area Included in Site: (17) %

Amount of Catchment Occupied by Site: (18) %

Storm Drainage System Within Site

Piped: (19) % Open Channels: (19) % Area Drained by System: (20) %

Open Channel Lining - Vegetation: (21) % Riprap: (21) % Concrete: (21) % Other: (21) %

Existing IMP(s) / BMP(s) (Indentified on Page 1, FORM 1, Catchment Information)

SDI ID: (22) Condition: ☐ Excellent ☐ Good ☐ Average ☐ Fair ☐ Poor (23)

SDI ID: (22) Condition: ☐ Excellent ☐ Good ☐ Average ☐ Fair ☐ Poor (23)

SDI ID: (22) Condition: ☐ Excellent ☐ Good ☐ Average ☐ Fair ☐ Poor (23)

Site Information

Type of Pavement: ☐ Bituminous ☐ Concrete ☐ Gravel ☐ Grid Pavers ☐ Other (24)

Pavement Condition: ☐ Excellent ☐ Good ☐ Average ☐ Fair ☐ Poor (25)

Underdrains can be easily directed to existing storm drains or daylighted: ☐ YES ☐ NO (26)

Gutter/Exterior Downspouts Present: ☐ YES ☐ NO (27)

Roof Connected Directly to Storm Drain: ☐ YES ☐ NO (28)

Roof Drains onto Impervious Surface: ☐ YES ☐ NO (29)

Obvious Existing Drainage Problems: ☐ Extensive ☐ Moderate ☐ Average ☐ Limited ☐ None (30)

Steep Slopes Present: ☐ Extensive ☐ Moderate ☐ Average ☐ Limited ☐ None (31)

Existing Landscaping: ☐ Extensive ☐ Moderate ☐ Average ☐ Limited ☐ None (32)

Mature / Specimen Trees: ☐ Extensive ☐ Moderate ☐ Average ☐ Limited ☐ None (33)

Area Available for Aboveground BMPs: ☐ Extensive ☐ Moderate ☐ Average ☐ Limited ☐ None (34)

Existing Cover of Potential Aboveground BMP Locations: ☐ Grass ☐ Landscaped ☐ Gravel ☐ Other Pervious ☐ Pavement ☐ Other Impervious (35)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
FORM 2 -- Site Information (concluded)

Commercial / Institutional

Islands Present: ☐ YES ☐ NO (36) Curb Present Around Island: ☐ YES ☐ NO (37)

Ground Level of Island Relative to Pavement: ☐ Above ☐ Equal ☐ Below (38)

Island Landscaping: ☐ Impervious ☐ Bare Earth ☐ Gravel ☐ Grass ☐ Mulch ☐ Herbaceous Plants ☐ Shrubs ☐ Trees (<2 in. DBH) ☐ Trees (2 - 4 in. DBH) ☐ Trees (>6 in. DBH) (39)

Trees have sufficient spacing to allow IMPs ☐ YES ☐ NO (40)

Parking area that can be directed to potential treatment area with little grading: (41) %

SITE SUMMARY

WQ_v (provided) :	(42)	Re_v (provided):	(43)
Area Treated (ac) :	(44)	Impervious Area Treated (ac):	(45)
Area Treated (%) :	(46)	Impervious Area Treated (%):	(47)

Photographs

No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)
No.	(48)	Description:	(49)

Comments (50)

IMP / BMP ID: (1) Site ID: (2) Catchment ID: (3)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
FORM 3 -- Opportunities and Constraints of Potential Management Practice

New LID IMP / SWM BMP Retrofit / New SWM BMP (4) Type (Sheets 4 & 5): (5)

State Plane Coordinates of IMP / BMP Centroid: (6)

Sketch Location of Footprint (with Approximate Dimensions) and Drainage Boundary on Site Map (7)

Identify all Impairments Addressed by Recommendation (Sheet 1): (8)

Treatment Area Ownership: ☐ Transportation ROW ☐ Utility ROW ☐ County ☐ Other Government ☐ Private ☐ Other (9)

Infrastructure / Structures / Buildings Impacted: ☐ YES ☐ NO (10)

Limited Impact to Adjacent Properties: ☐ YES ☐ NO (11)

Area Accessible for Construction: ☐ YES ☐ NO (12)

Area Accessible for Maintenance: ☐ YES ☐ NO (13)

Limited Permitting Issues: ☐ YES ☐ NO (14)

Jurisdictional Wetlands Impacted: ☐ YES ☐ NO (15)

Forest Retention Area Impacted: ☐ YES ☐ NO (16)

Conservation Easement Impacted: ☐ YES ☐ NO (17)

Utilities Present: ☐ None ☐ Natural Gas ☐ Electric ☐ Telephone ☐ Cable ☐ Water ☐ Sewer ☐ Other (18)

Utilities Impacted: ☐ None ☐ Natural Gas ☐ Electric ☐ Telephone ☐ Cable ☐ Water ☐ Sewer ☐ Other (19)

Impacted Utilities: ☐ Above Gound ☐ Underground (20)

Critical Area Impacted: ☐ YES ☐ NO (21)

Mature / Specimen Trees Impacted: ☐ YES ☐ NO (22)

Existing Landscaping Impacted: ☐ YES ☐ NO (23)

Underdrain Needed: ☐ YES ☐ NO (24) Underdrains Can Discharge: ☐ YES ☐ NO (25)

Soils are Suitable: ☐ YES ☐ NO (26) Ground Water Table Level Suitable: ☐ YES ☐ NO (27)

Estimate IMP / BMP drainage area included on site: (28) ac (29) %

Retrofit of Existing SWM BMP

SDI ID: (30) Add Forebay: ☐ YES ☐ NO (31)

Modify Outlet Stucture: ☐ YES ☐ NO (32) Add Aquatic Bench: ☐ YES ☐ NO (33)

Grade Bottom of Facility: ☐ YES ☐ NO (34) Plant Native Vegetation: ☐ YES ☐ NO (35)

Provide Additional Storage Volume: ☐ YES ☐ NO (36)

Excavation / Raise the Embankment: ☐ YES ☐ NO (37)

UPPER PATUXENT RIVER WATERSHED RESTORATION ACTION STRATEGY (WRAS)
FORM 3 -- Opportunities and Constraints of Potential Management Practice (concluded)

IMP / BMP SUMMARY

WQ_v (provided): (38) Re_v (provided): (39)

Area Treated (ac): (40) Impervious Area Treated (ac): (41)

Photographs

No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)
No.	(42)	Description:	(43)

Comments (44)