

Figure 5. Location and Distribution of the Assessment Sites in the Vicinity of Laurel.

5. SITE RANKING

The completed forms are used to rank the sites. The purpose of the ranking is to identify the sites that would most benefit from the retrofit of treatment applications. Forty ranking parameters were identified and include the following:

- Impairment type
- Catchment water quality volume
- Predominant land use
- Sanitary sewer type
- Area served by storm drain system
- Percentage of channels that are not concrete
- Catchment existing storm water treatment
- Treatment provided for catchment
- Site percent impervious
- Site ground water recharge volume
- Site existing storm water treatment
- Treatment provided for site
- Pavement condition
- Roof connected directly to storm drain
- Existing drainage problems
- Existing landscaping
- Area available for above ground treatment
- Traffic islands
- Ground level of traffic island
- Trees have sufficient spacing for treatment
- Catchment percent impervious
- Catchment ground water recharge volume
- Depth to ground water
- Water supply type
- Percentage of drainage system that is piped
- Location of system in catchment
- Percent of catchment that is treated
- Site ownership
- Site water quality volume
- Site storm drainage type
- Percent of site that is treated
- Pavement type
- Underdrains could be installed
- Roof drains directly onto impervious area
- Steep slopes
- Mature / specimen trees
- Existing cover for potential sties
- Curb around traffic island
- Traffic island landscaping
- Area that can be directed to treatment

Each ranking parameter was given a score ranging from zero and one. The scoring range was developed so that a high score yielded a site that would most benefit from treatment retrofits or where retrofits would be relatively easy to implement. Three examples of the ranking system used in the Upper Patuxent River WRAS follow.

1. Existing Water Quality. A site with poor existing water quality would rank higher than a site with good water quality. Water quality was determined based on the Basin Condition Scoring (BCS) methodology developed for the Upper Patuxent River Watershed (Victoria, et al, 2003).
2. Existing Storm Water Management. Although storm water treatment is desirable from a water quality perspective, a site with existing storm water treatment would rank low. An attempt was made in the ranking procedure to address the type of facility and its overall condition. However, it is very likely that existing SWM would benefit from additional upstream treatment. Fish and macroinvertebrate studies including the one conducted by Prince George's County in Spring 2000, have shown that SWM ponds alone are not enough to protect physical habitat structure (cover, substrate, sedimentation) or hydrology (baseflow, thermal fluxes or flashiness). Therefore, the implication is that SWM ponds are limited in their ability to protect streams and cannot reproduce predevelopment hydrological functions.

3. Site Constraints. A site with adequate area to construct SWM would also rank high. Areas that are covered with grass would rank higher than area covered with pavement. Conversely, a site that has a large portion that is covered with steep slopes or mature trees would rate lower. However, the grassed areas should still be treated with LID techniques. Several studies comparing grass / turf areas to meadow as shown significant difference in runoff and pollutant removal (meadow areas are more efficient and have less runoff).

The scoring for the ranking components developed for the Upper Patuxent River WRAS is presented on Sheet 2 of 2 in Appendix C.

The ranking parameters are not equally significant. To indicate the relative important of each ranking parameter, weighting factors were used. The less significant parameters were given a weight of less than one and significant parameters were given a weight greater than one. The derivation of the scores is presented on Sheet 1 of 2 in Appendix C. This sheet provides the score for each of the 40 ranking parameters for each of the 48 sites. The ranked sites are presented in Table 1.

The 48 sites were located in 13 subwatersheds. To facilitate comparison of sites within the individual subwatersheds, the sites were grouped by subwatershed. Within each subwatershed, the sites were ranked. The results are presented in Table 2.

It is anticipated that the ranking components, scoring and weighting will be adapted and refined with use and for use for other applications, depending on the goals of the project. Typically, an area with few site constraints would rank low. However, LID techniques are quite adaptable. For example, slopes that are conditioned and planted with native vegetation would decrease the amount of runoff. Bioretention benches could also be used on slopes.

One of the important tenets of LID is to subdivide larger sites into smaller drainage areas. By dividing sites into smaller drainage units, the number of LID practices that can be used is increased. There are many methods that can be used to subdivide larger drainage areas into micro drainage areas and employ LID techniques. For example, by using traffic calming devices (curb extensions, traffic humps, etc.) streets can be narrowed, divided into smaller drainage units and bioretention installed in the curb extensions and at storm drain inlets.

Also, the presence of mature vegetation at a site that is extensively landscaped was ranked low because the vegetation would need to be removed. In many cases, the landscaping consists of invasive plantings. Because invasive plants should be removed, LID practices could be installed without any adverse impact. Therefore, a new ranking factor needs to be developed. Training for site assessors to identify invasive species will be required.

Table 1. Site Ranking Summary

Site Name	Site Description	Catchment	Subwatershed	Score	Rank
LSHS	Laurel Senior High School	CB01	Crows Branch	31.23	1
EMS	Eisenhower Middle School	T501	Tributary 5	29.78	2
DRES	Deerfield Run Elementary School	T603	Tributary 6	29.08	3
HDB1	Home Depot	GB01	Green Branch	27.73	4
TARG	Target	GB08	Green Branch	27.13	5
SPOR	Sports Authority	GB08	Green Branch	26.88	6
JHES	James Harrison Elementary School	T601	Tributary 6	26.88	7
BORD	Borders	GB08	Green Branch	26.73	8
HOME	Home Place	GB08	Green Branch	26.73	8
PIER	Pier 1	GB08	Green Branch	26.73	8
PETS	Petsmart	GB08	Green Branch	26.53	11
STAP	Staples	GB08	Green Branch	26.48	12
RES	Rockledge Elementary School	T104	Tributary 1	26.23	13
SOE2	Samuel Ogle Elementary School	T105	Tributary 1	26.18	14
LCH	Laurel City Hall	WB02	Walker Branch	26.08	15
WIBC	William Irwin Buck Center	T101	Tributary 1	25.98	16
GGPL	Granville Gude Park & Lakehouse	BB07	Bear Branch	25.68	17
LFL	Laurel Fringe Lot - Commuter Parking	T502	Tributary 5	25.38	18
LHIC	Lowes Home Improvement Center	BB05	Bear Branch	25.33	19
YMCA	YMCA	T301	Tributary 3	25.28	20
HDB2	Home Depot	GB02	Green Branch	25.18	21
LLEP	Laurel Lakes Executive Park	BB10	Bear Branch	24.88	22
BUCK	Buckingham Park	MB01	Marsh Branch	24.88	23
YTES	Yorktown Elementary School	T201	Tributary 2	24.83	24
SOE1	Samuel Ogle Elementary School	T103	Tributary 1	24.83	25
SPC	Somerset Park Condominium	MB02	Marsh Branch	23.88	26
STES	Scotchtown Hills Elementary School	WB01	Walker Branch	23.78	27
DPMK	Don Pablos Mexican Kitchen	BB12	Bear Branch	23.37	28
CCB1	Chevy Chase Bank	BB01	Bear Branch	23.30	29
LONE	Lone Star Restaurant	BB12	Bear Branch	22.87	30
HDL	Home Depot	UP02	Upper Patuxent River	22.83	31
MARY	Marymont Apartments	BB11	Bear Branch	22.78	32
CCB2	Chevy Chase Bank	BB01	Bear Branch	22.78	33
LVFD	Laurel Volunteer Fire Department	BB04	Bear Branch	22.73	34
CHAP	Chapel Cove at Laurel Lakes Townhouses	BB09	Bear Branch	22.58	35
LRH	Laurel Regional Hospital	BB02	Bear Branch	22.18	36
MPL	10th Street Cul de Sac	HB2	Horsepen Branch	22.08	37
MD3C	Robert S. Crain Highway Interchange	T406	Tributary 4	21.33	38
SFIT	Sport Fit Total Fitness Club	UP02	Upper Patuxent River	20.88	39
PVAL	Parkview at Laurel Assisted Living	T502	Tributary 5	20.83	40
MD3D	Robert S. Crain Highway Interchange	T407	Tributary 4	20.43	41
WPTC	Whitehall Pool and Tennis Club	T102	Tributary 1	20.33	42
MD3B	Robert S. Crain Highway Interchange	T405	Tributary 4	20.33	43
PWR	Patuxent Research Refuge Visitor Center	UP03	Upper Patuxent River	20.13	44
MD3A	Robert S. Crain Highway Interchange	T404	Tributary 4	19.88	45
10ST	Bowie Municipal Parking Lot	HB1	Horsepen Branch	19.78	46
ASHF	Ashford at Avondale Townhouses	BB06	Bear Branch	19.63	47
MFTH	Mayfair Townhouses	BB03	Bear Branch	18.88	48

Table 2. Site Ranking Summarized by Subwatershed

Site Name	Site Description	Catchment	Subwatershed	Score	Rank
GGPL	Granville Gude Park & Lakehouse	BB07	Bear Branch	25.68	17
LHIC	Lowes Home Improvement Center	BB05	Bear Branch	25.33	19
LLEP	Laurel Lakes Executive Park	BB10	Bear Branch	24.88	22
DPMK	Don Pablos Mexican Kitchen	BB12	Bear Branch	23.37	28
CCB1	Chevy Chase Bank	BB01	Bear Branch	23.30	29
LONE	Lone Star Restaurant	BB12	Bear Branch	22.87	30
MARY	Marymont Apartments	BB11	Bear Branch	22.78	32
CCB2	Chevy Chase Bank	BB01	Bear Branch	22.78	32
LVFD	Laurel Volunteer Fire Department	BB04	Bear Branch	22.73	34
CHAP	Chapel Cove at Laurel Lakes Townhouses	BB09	Bear Branch	22.58	35
LRH	Laurel Regional Hospital	BB02	Bear Branch	22.18	36
ASHF	Ashford at Avondale Townhouses	BB06	Bear Branch	19.63	47
MFTH	Mayfair Townhouses	BB03	Bear Branch	18.88	48
LSHS	Laurel Senior High School	CB01	Crows Branch	31.23	1
HDB1	Home Depot	GB01	Green Branch	27.73	4
TARG	Target	GB08	Green Branch	27.13	5
SPOR	Sports Authority	GB08	Green Branch	26.88	6
BORD	Borders	GB08	Green Branch	26.73	8
HOME	Home Place	GB08	Green Branch	26.73	8
PIER	Pier 1	GB08	Green Branch	26.73	8
PETS	Petsmart	GB08	Green Branch	26.53	11
STAP	Staples	GB08	Green Branch	26.48	12
HDB2	Home Depot	GB02	Green Branch	25.18	21
MPL	10th Street Cul de Sac	HB2	Horsepen Branch	22.08	37
10ST	Bowie Municipal Parking Lot	HB1	Horsepen Branch	19.78	46
BUCK	Buckingham Park	MB01	Marsh Branch	24.88	22
SPC	Somerset Park Condominium	MB02	Marsh Branch	23.88	26
RES	Rockledge Elementary School	T104	Tributary 1	26.23	13
SOE2	Samuel Ogle Elementary School	T105	Tributary 1	26.18	14
WIBC	William Irwin Buck Center	T101	Tributary 1	25.98	16
SOE1	Samuel Ogle Elementary School	T103	Tributary 1	24.83	24
WPTC	Whitehall Pool and Tennis Club	T102	Tributary 1	20.33	42
YTES	Yorktown Elementary School	T201	Tributary 2	24.83	24
YMCA	YMCA	T301	Tributary 3	25.28	20
MD3C	Robert S. Crain Highway Interchange	T406	Tributary 4	21.33	38
MD3D	Robert S. Crain Highway Interchange	T407	Tributary 4	20.43	41
MD3B	Robert S. Crain Highway Interchange	T405	Tributary 4	20.33	42
MD3A	Robert S. Crain Highway Interchange	T404	Tributary 4	19.88	45
EMS	Eisenhower Middle School	T501	Tributary 5	29.78	2
LFL	Laurel Fringe Lot - Commuter Parking	T502	Tributary 5	25.38	18
PVAL	Parkview at Laurel Assisted Living	T502	Tributary 5	20.83	40
DRES	Deerfield Run Elementary School	T603	Tributary 6	29.08	3
JHES	James Harrison Elementary School	T601	Tributary 6	26.88	6
HDL	Home Depot	UP02	Upper Patuxent River	22.83	31
SFIT	Sport Fit Total Fitness Club	UP02	Upper Patuxent River	20.88	39
PWR	Patuxent Research Refuge Visitor Center	UP03	Upper Patuxent River	20.13	44
LCH	Laurel City Hall	WB02	Walker Branch	26.08	15
STES	Scotchtown Hills Elementary School	WB01	Walker Branch	23.78	27

6. PILOT SITES

The County wanted to have five sites evaluated for opportunities and constraints related to the implementation of potential management practices. These five pilot sites would include projects that would demonstrate the retrofit potential of Low Impact Development (LID) techniques. Because these sites would showcase LID techniques, the sites will need to be highly visible. The sites should also address water quality issues and be important to the community. To address these goals, the County made a decision to locate the five pilot sites in the Bear Branch watershed. The Bear Branch watershed was selected based on numerous problems within the watershed and within Laurel Lakes. Projects within the watershed will be highly visible, especially if they could be located adjacent to Laurel Lakes. The location of the pilot sites are presented on Figure 6.

To demonstrate LID techniques, the County decided to have each site have a unique land use. The following land ownership and land uses were selected: (1) municipal – park, (2) commercial – retail, (3) commercial – office park, (4) residential – apartments, and (5) residential – townhouses. The corresponding site names are as follows: (1) Granville Gude Park and Lakehouse, (2) Lowes Home Improvement Center, (3) Laurel Lakes Executive Park, (4) Marymont Apartments, and (5) Chapel Cove at Laurel Lakes. These sites are included in bold italic font in Tables 1 and 2.

The opportunities and constraints for each site were assessed using Form 3. Focusing on the opportunities of the site, potential treatment for storm water was considered. Preferred potential treatment applications include Low Impact Development (LID) techniques called Integrated Management Practices (IMPs). Potential treatment applications also include SWM Best Management Practices (BMPs). Descriptions of the various IMPs / BMPs are found on Sheets 4 of 9 and 5 of 9 in Appendix B. In Appendix B, Sheets 6 of 9 and 7 of 9 identify the water quality impairments that are addressed for each IMP / BMP technique. The applicability of each IMP / BMP is identified on Sheets 8 of 9 and 9 of 9 in Appendix B.

Treatment was provided for as much of the site as possible, targeting impervious areas. Treatment applications that addressed water quality, quantity control and ground water recharge were given the highest priority. Treatment applications were evaluated on the basis of the benefit provided and constructability. Constructability includes constraints such as the presence of utilities, steep slopes, existing vegetation and mature trees; the suitability of soils and ground water table; and accessibility. Parking needs of the site were assessed when proposing a potential treatment application. In those areas where parking was in short supply or where vehicular access was required, parking and access were not altered.

In many situations, additional area could be treated by diverting flow. An inexpensive flow diversion is an asphalt “speed bump.” If a “speed bump” would not be accepted by the site owner, a trench drain could be substituted.

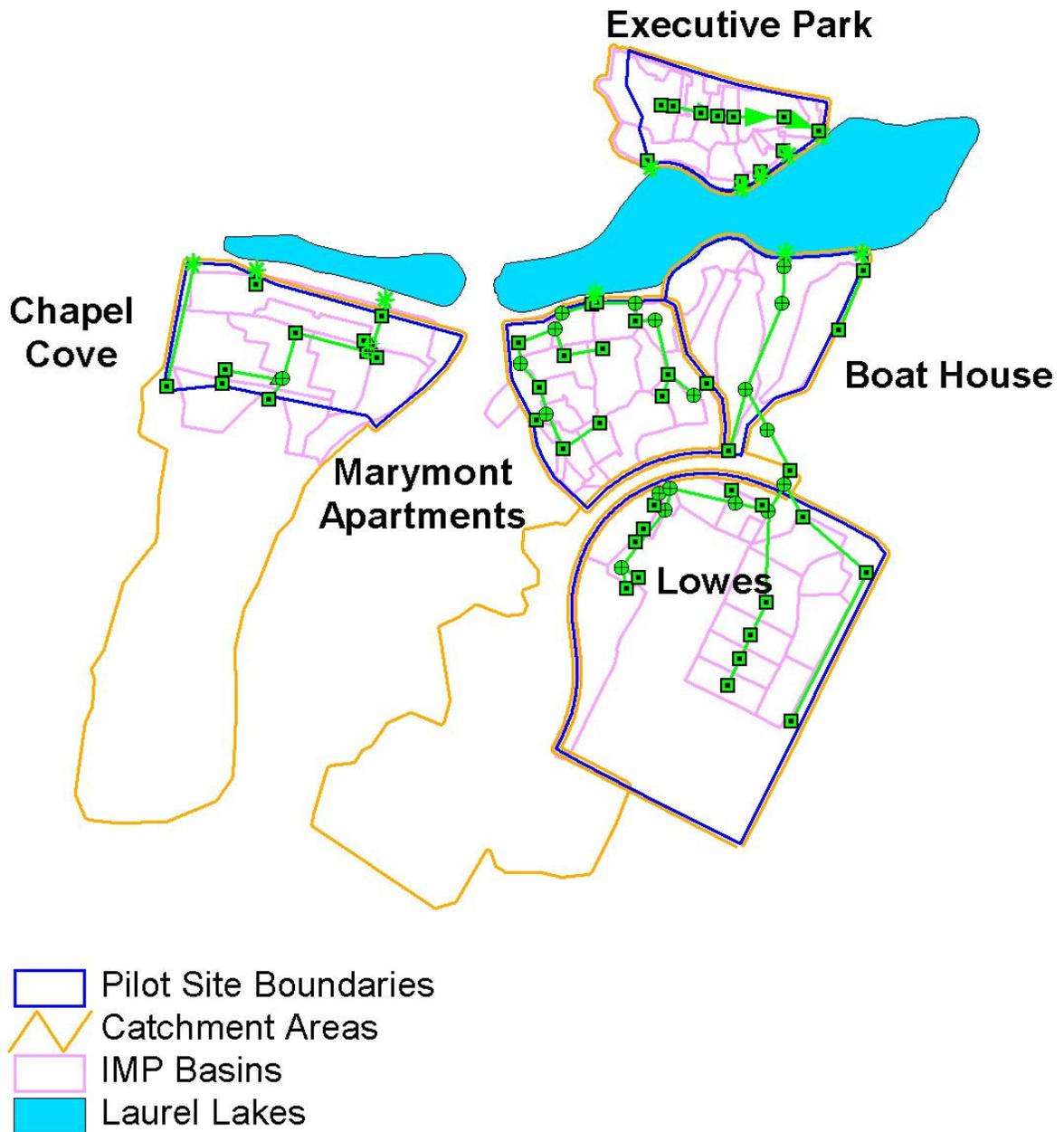


Figure 6. Location of the Five Pilot Sites

There were situations where storm water could not be practically treated or captured without disruption of parking or traffic flow. These situations were limited to the two residential sites where parking areas were at a premium so narrowing of the street to create bioretention areas was not considered viable. Both of the residential sites had an efficient storm drainage system so that when the storm water entered the system, it was conveyed underground. With an underground storm drainage system, it is only possible treatment location was at the end of pipe, which was not the goal of the project. However, the use of the LID techniques was maximized where possible. The advantage of LID techniques is that they can be used to effectively treat a large majority of situations.

After the site is assessed for the viability of treatment, specific practices are proposed. The approximate available footprint is noted on the each site map. The drainage area to the treatment application is also drawn on the site map. Each treatment application is documented on Form 3. The documentation includes photographs of the proposed location.

Following the field assessment, the information from the forms is entered into the electronic version. Information recorded on the site map is entered into the County's GIS data base. The data collected in the field is used to complete the forms. The control provided by each treatment application is recorded on Form 3. The control provided by every treatment application within the site is summed and recorded on Form 2. Likewise, the control provided in each site within the catchment is summed and recorded on Form 1. All information is recorded electronically. The completed forms are found in Appendix E. The willingness of the parcel owners will determine which sites remain candidates for the installation of storm water management retrofits.