

**Appendix D**  
**Prioritization of Stormwater Management Projects**



## Appendix D: Prioritization of Stormwater Management Projects

### D.1 INTRODUCTION

The stormwater management measures that were identified as potential projects in the Declaration Run and Riverside watersheds were prioritized based on the nine criteria listed in Table D-1. The prioritization was used to determine whether a project would be included in Harford County's Capital Improvement Projects and evaluated further as part of the Small Watershed Action Plan (SWAP) for the Declaration Run and Riverside Watersheds.

The maximum score for each criterion was 10 points, and the total maximum score was 90 points. A high score represents a good stormwater management opportunity or Best Management Practice (BMP), while a low score represents a less favorable opportunity. Additional information about each criterion is provided after Table D-1.

Table D-1: Stormwater Management Prioritization Criteria

| Criterion                             | Maximum Score    |
|---------------------------------------|------------------|
| A. Property Ownership                 | 10 points        |
| B. Access to Project Site             | 10 points        |
| C. Drainage Area                      | 10 points        |
| D. Contributing Impervious Area       | 10 points        |
| E. Cost                               | 10 points        |
| F. Utility Impacts                    | 10 points        |
| G. Environmental Impacts              | 10 points        |
| H. Stormwater Management Era          | 10 points        |
| I. Estimated Pollutant Load Reduction | 10 points        |
| <b>Total</b>                          | <b>90 points</b> |

#### A. Property Ownership

The property ownership criterion is the impact of property ownership on a proposed project. Projects on public sites owned by Harford County would be easier to implement than projects on privately owned sites because property or easements would not need to be acquired on public sites but could be required on privately owned sites. In addition, the cost of acquiring property or easements could make a project infeasible or not cost-effective.

Whether land use would need to be changed to implement a project would also affect the project. Projects would be easier to implement on sites with land that is already dedicated to stormwater management (i.e., no change in land use would be required) than sites that would require a change in land use.

Table D-2 shows the points assigned for private and public ownership and whether land use would need to be changed.

Table D-2: Property Ownership

| Ownership | Required Change in Land Use? | Points |
|-----------|------------------------------|--------|
| Private   | Yes                          | 3      |
| Private   | No                           | 5      |
| Public    | Yes                          | 7      |
| Public    | No                           | 10     |

## Appendix D: Prioritization of Stormwater Management Projects

### B. Access to Project Site

Site access for construction was rated as good, fair, or poor. Fair access was defined as good access but limited space for staging without compromising existing land use (e.g., parking). Poor access was defined as access that would require demolition of structures, road construction, and acquisition of easements on private property, or clearing and grubbing of trees. Table D-3 shows the points assigned for access to the project site.

**Table D-3: Site Access**

| Access | Points |
|--------|--------|
| Poor   | 3      |
| Fair   | 7      |
| Good   | 10     |

### C. Contributing Drainage Area

The drainage area criterion is the size of the contributing drainage area for the project. Larger drainage areas have more potential to provide water quality benefits than smaller areas. Drainage areas were delineated based on County-provided data that included 2-foot contours and storm drain information and information in stormwater management plans for existing facilities. Drainage areas that were less than 25th percentile of the total range were assigned lower scores, and drainage areas that were higher than the 75th percentile value were assigned higher scores. Table D-4 shows the points assigned for drainage area in the two study watersheds.

**Table D-4: Drainage Area**

| Percentile of Total Drainage Range | Declaration Run Watershed |        | Riverside Watershed   |        |
|------------------------------------|---------------------------|--------|-----------------------|--------|
|                                    | Drainage Area (Acres)     | Points | Drainage Area (Acres) | Points |
| 25th percentile                    | 2.0                       | 3      | 3.0                   | 3      |
| 50th percentile                    | 3.0                       | 5      | 5.0                   | 5      |
| 75th percentile                    | 7.0                       | 7      | 35.0                  | 7      |
| >75th percentile                   | >7.0                      | 10     | >35.0                 | 10     |

### D. Contributing Impervious Area

The contributing impervious area criterion is based on the number of impervious acres that would drain to a proposed stormwater facility. The larger the impervious area, the greater the potential for stormwater management. The impervious area was calculated using County GIS data. Impervious areas that were lower than the 25<sup>th</sup> percentile value were assigned lower scores and impervious areas that were higher than the 75<sup>th</sup> percentile value were assigned higher scores. Table D-5 shows the points assigned for the contributing impervious area in the two study watersheds.

## Appendix D: Prioritization of Stormwater Management Projects

**Table D-5: Contributing Impervious Area**

| Percentile of Contributing Impervious Area | Declaration Run Watershed |        | Riverside Watershed     |        |
|--|---------------------------|--------|-------------------------|--------|
|  | Impervious Area (Acres)   | Points | Impervious Area (Acres) | Points |
| 25th percentile                            | 1.0                       | 3      | 1.0                     | 3      |
| 50th percentile                            | 2.0                       | 5      | 3.0                     | 5      |
| 75th percentile                            | 3.0                       | 7      | 12.0                    | 7      |
| >75th percentile                           | >3.1                      | 10     | >12.0                   | 10     |

### E. Cost

The scores for cost were based on a comparison of costs for a new or retrofit project for each type of proposed stormwater management facility. Relative capital costs were adapted from the Maryland Department of the Environment's *Costs of Stormwater Management Practices in Maryland Counties* (MDE 2011). Table D-6 shows the points assigned for cost in the two study watersheds.

**Table D-6: Cost**

| Cost Percentile  | Declaration Run Watershed |        | Riverside Watershed |        |
|------------------|---------------------------|--------|---------------------|--------|
|                  | Cost                      | Points | Cost                | Points |
| >75th percentile | >\$201,100                | 3      | >\$321,200          | 3      |
| 50th percentile  | \$140,000                 | 7      | \$85,700            | 7      |
| 75th percentile  | \$201,100                 | 5      | \$321,200           | 5      |
| 25th percentile  | \$79,600                  | 10     | \$55,900            | 10     |

### F. Utility Impacts

An estimate of the impact of utilities on project implementation was based on data collected during the field reconnaissance. The points are based on the typical impacts existing utilities can have on a project during construction. An example of a major impact is having to relocate a utility, and an example of a minor impact is having to raise manhole rims. Table D-7 shows the points assigned for utility impacts.

**Table D-7: Utility Impacts**

| Type of Impact | Explanation  | Points |
|----------------|--|--------|
| Major          | Utilities would be affected directly during project implementation and may have to be relocated. | 3      |
| Minor          | Utilities are near the project area.   | 5      |
| Unknown        | There are potential impacts, but data are insufficient to determine the extent of the impact.    | 5      |
| None           | No utilities were observed in the project vicinity.  | 10     |

## Appendix D: Prioritization of Stormwater Management Projects

### G. Environmental Impacts

Potential environmental impacts were assigned the points listed in Table D-8. A lower score was assigned to projects that would affect wetlands or floodplains because obtaining regulatory approval for wetland and floodplain impacts can be time-consuming and expensive.

Table D-8: Environmental Impacts

| Type of Impact  | Points |
|---|--------|
| Impacts to wetlands, large number of mature trees, and floodplains          | 3      |
| Minor impacts to potential wetlands, some mature trees, streams, dam safety | 5      |
| Impacts to small trees or saplings (<6 inches in diameter)                  | 7      |
| No potential impacts  | 10     |

### H. Stormwater Management Era

As the new National Pollutant Discharge Elimination System municipal separate storm sewer system permit is expected to focus on restoration of pre-1985 impervious area that has little or no stormwater management, a higher priority is given to all the sites that drain pre-1985 impervious cover. For areas draining to existing stormwater management facilities, the age of impervious cover draining to the facility was assumed to be the as-built date of the stormwater management facility. For drainage areas where a new stormwater management facility is proposed, the age of impervious cover was estimated using the year of construction date provided in the property ownership layer. A higher priority was given to proposed projects treating impervious area developed prior to 1985 and a lower priority was given to impervious area developed after 2002 as they are provided with adequate stormwater control based on the current Maryland stormwater management regulations. Table D-9 shows the points assigned for the date of construction of the impervious cover.

Table D-9: Stormwater Management Era

| Impervious Cover Construction Date | Points |
|------------------------------------|--------|
| After 2010                         | 1      |
| 2002–2010                          | 3      |
| 1985–2002                          | 7      |
| Pre-1985                           | 10     |

### I. Estimated Pollutant Load Reduction

The estimated pollutant load reduction criterion evaluates the water quality benefits of a project by evaluating the reduction of the pollutant loadings that would be achieved by the proposed project. The pollutant reduction estimates are based on the performance-based removal efficiencies for total nitrogen, total phosphorus, and total suspended solids.

The proposed projects were modeled using the Center for Watershed Protection's Watershed Treatment Model (WTM), and the pollutant load reductions from each potential project were estimated. The pollutant removal rates provided in Table 4 of the Maryland Department of the Environment's *Draft Accounting for Stormwater Waste Load Allocations and Impervious Acres Treated* (MDE 2011) were used in the WTM model. Priority was given to the sites that would remove higher amounts of pollutants.

## Appendix D: Prioritization of Stormwater Management Projects

Tables D-10, D-11, and D-12 show the points assigned for the estimated pollutant load reduction for total nitrogen, total phosphorus, and total suspended solids, respectively.

**Table D-10: Estimated Pollutant Load Reduction for Total Nitrogen**

|                       | Declaration Run      |        | Riverside            |        |
|-----------------------|----------------------|--------|----------------------|--------|
|                       | Reduction (lbs/year) | Points | Reduction (lbs/year) | Points |
| <b>Total Nitrogen</b> |                      |        |                      |        |
| 25th percentile       | 12.0                 | 1      | 30                   | 1      |
| 50th percentile       | 25.0                 | 1.5    | 42                   | 1.5    |
| 75th percentile       | 43.0                 | 2.5    | 142                  | 2.5    |
| >75th percentile      | >43.0                | 3.3    | >142                 | 3.3    |

**Table D-11: Estimated Pollutant Load Reduction for Total Phosphorus**

|                         | Declaration Run      |        | Riverside            |        |
|-------------------------|----------------------|--------|----------------------|--------|
|                         | Reduction (lbs/year) | Points | Reduction (lbs/year) | Points |
| <b>Total Phosphorus</b> |                      |        |                      |        |
| 25th percentile         | 2.0                  | 1      | 5                    | 1      |
| 50th percentile         | 4.0                  | 1.5    | 8                    | 1.5    |
| 75th percentile         | 7.0                  | 2.5    | 33                   | 2.5    |
| >75th percentile        | >7.0                 | 3.3    | >33                  | 3.3    |

**Table D-12: Estimated Pollutant Load Reduction for Total Suspended Solids**

|                               | Declaration Run      |        | Riverside            |        |
|-------------------------------|----------------------|--------|----------------------|--------|
|                               | Reduction (lbs/year) | Points | Reduction (lbs/year) | Points |
| <b>Total Suspended Solids</b> |                      |        |                      |        |
| 25th percentile               | 404.0                | 1      | 1,024                | 1      |
| 50th percentile               | 754.0                | 1.5    | 1,549                | 1.5    |
| 75th percentile               | 1,281.0              | 2.5    | 6,521                | 2.5    |
| >75th percentile              | >1,281.0             | 3.3    | >6,521               | 3.3    |

### D.2 PRIORITY RANKING OF PROPOSED PROJECTS

The priority rankings of the stormwater management projects in the Declaration Run and Riverside watersheds are provided in Tables D-13 and D-14, respectively.

**PAGE INTENTIONALLY LEFT BLANK**



**Appendix D: Prioritization of Stormwater Management Projects**

**Table D-13: Priority Ranking of Proposed Projects in the Declaration Run Watershed**

| Project ID       | Project Location   | Project Type                           | Property Ownership | Access to Project Site | Drainage Area | Impervious Area | Cost | Utility Impacts | Environmental Impacts | SWM Era | Estimated Pollutant Load Reduction | Total Score | County Priority | Rank |
|------------------|--|--|--------------------|------------------------|---------------|-----------------|------|-----------------|-----------------------|---------|------------------------------------|-------------|-----------------|------|
|                  |  |  |                    |                        |               |                 |      |                 |                       |         |                                    |             |                 |      |
| D-SWM0110 (ES-1) | Church Creek Elementary School                               | Retrofit – infiltration basin          | 10                 | 10                     | 10            | 10              | 3    | 10              | 10                    | 7       | 10                                 | 80          | High            | 1    |
| D-NS-9           | Golden Rod Court   | Tree box filters                       | 3                  | 10                     | 7             | 10              | 5    | 5               | 10                    | 7       | 8                                  | 65          | Low             | 2    |
| D-NS-12          | Church Creek Elementary School                               | Bioretention                           | 7                  | 10                     | 3             | 3               | 10   | 10              | 10                    | 7       | 3                                  | 63          | High            | 3    |
| D-ES-8           | Banberry Drive   | Retrofit – step pool conveyance system | 5                  | 3                      | 10            | 10              | 5    | 10              | 3                     | 7       | 10                                 | 63          | High            | 3    |
| D-ES-5           | North end of Foxglove Court                                  | Retrofit – bioretention                | 5                  | 3                      | 10            | 7               | 5    | 10              | 3                     | 7       | 10                                 | 60          | Low             | 5    |
| D-NS-3           | Liriope Court  | Green roofs                            | 3                  | 10                     | 3             | 3               | 10   | 10              | 10                    | 7       | 3                                  | 59          | Low             | 6    |
| D-ES-15          | Procedure Way  | Retrofit – bioretention                | 5                  | 10                     | 5             | 7               | 7    | 5               | 5                     | 7       | 8                                  | 59          | High            | 6    |
| D-ES-7           | Germander Drive and Church Creek Road                        | Bioretention and water quality swale   | 3                  | 10                     | 5             | 5               | 10   | 10              | 5                     | 7       | 3                                  | 58          | High            | 8    |
| D-ES-2           | End of Oregonum Court  | Retrofit – wetland                     | 5                  | 3                      | 10            | 10              | 3    | 10              | 3                     | 7       | 7                                  | 58          | High            | 8    |
| D-NS-8           | Dalimont Place   | Bioretention                           | 3                  | 7                      | 7             | 7               | 7    | 5               | 7                     | 7       | 8                                  | 58          | High            | 8    |
| D-ES-6           | Germander Drive  | Bioretention                           | 5                  | 7                      | 7             | 5               | 7    | 5               | 7                     | 7       | 6                                  | 56          | Medium          | 11   |
| D-NS-7           | Foxglove Court   | Step pool conveyance                   | 3                  | 3                      | 7             | 7               | 3    | 10              | 3                     | 7       | 9                                  | 52          | Low             | 12   |
| D-ES-12          | End of Margold Lane  | Retrofit – micropool                   | 5                  | 3                      | 3             | 3               | 10   | 10              | 5                     | 7       | 5                                  | 51          | Medium          | 13   |
| D-NS-13          | Church Creek Road across from Church Creek Elementary School | Green street                           | 7                  | 10                     | 3             | 3               | 5    | 2               | 10                    | 7       | 3                                  | 50          | High            | 14   |
| D-NS-4           | Church Creek Road  | Green street                           | 7                  | 10                     | 5             | 5               | 3    | 2               | 3                     | 7       | 5                                  | 47          | Medium          | 15   |

**Table D-14: Priority Ranking of Proposed Projects in the Riverside Watershed**

| Project ID               | Project Location             | Project Type       | Property Ownership | Access to Project Site | Drainage Area | Impervious Area | Cost | Utility Impacts | Environmental Impacts | SWM Era | Estimated Pollutant Load Reduction | Total Score | County Priority | Rank |
|--------------------------|------------------------------|--------------------|--------------------|------------------------|---------------|-----------------|------|-----------------|-----------------------|---------|------------------------------------|-------------|-----------------|------|
|                          |                              |                    |                    |                        |               |                 |      |                 |                       |         |                                    |             |                 |      |
| R-ES-11                  | Halls Chance Road            | Retrofit – wetland | 5                  | 10                     | 10            | 10              | 3    | 10              | 3                     | 10      | 10                                 | 71          | High            | 1    |
| R-NS-7                   | Caldwell Court South         | Retrofit – swale   | 5                  | 10                     | 10            | 10              | 3    | 5               | 7                     | 10      | 10                                 | 70          | High            | 2    |
| R-SWM0491 <sup>(1)</sup> | West end of Millennium Drive | Retrofit – swale   | 5                  | 10                     | 7             | 7               | 7    | 10              | 10                    | 3       | 8                                  | 67          | Low             | 3    |
| R-SWM0627 <sup>(1)</sup> | Millennium Drive             | Retrofit – swale   | 5                  | 10                     | 5             | 7               | 5    | 10              | 10                    | 3       | 5                                  | 60          | Low             | 4    |
| R-NS-1                   | Belcamp Park                 | Bioretention       | 3                  | 10                     | 7             | 5               | 5    | 10              | 3                     | 7       | 8                                  | 58          | High            | 5    |
| R-NS-6                   | Winners Circle               | Rain garden        | 3                  | 7                      | 3             | 3               | 10   | 10              | 10                    | 7       | 3                                  | 56          | Low             | 6    |
| R-NS-8                   | Carlyle Garth                | Retrofit – swale   | 5                  | 3                      | 3             | 3               | 10   | 10              | 7                     | 7       | 3                                  | 51          | High            | 7    |

<sup>(1)</sup> Low-priority project because it was designed according to current Maryland stormwater management regulations

**PAGE INTENTIONALLY LEFT BLANK**