



Basin Ranking Matrix Field Evaluation Ocean County, New Jersey

Prepared for:

American Littoral Society
Tim Dillingham, Executive Director
18 Hartshorne Drive, Suite 1
Highlands, New Jersey 07732

Prepared by:

Princeton Hydro, LLC
1108 Old York Road, Suite 1
Post Office Box 720
Ringoes, New Jersey 08551
(P) 908.237.5660
(F) 908.237.5666
www.princetonhydro.com

Paul Cooper
pcooper@princetonhydro.com
Project Number: 679.003

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1.0 Introduction

An important element of the American Littoral Society's (ALS) *Implementation of Stormwater Management Strategies to Long Swamp Creek, Lower Toms River and Barnegat Bay* project (NJDEP RP11-038) is the development of a basin ranking matrix. The matrix, which consists of a number of input parameters, is intended to provide a non-biased means of prioritizing existing stormwater management facilities for retrofit consideration. Details of the ranking matrix are provided herein. This memorandum provides a brief assessment of the basin ranking methodology. Specifically, it details the results of a trial evaluation of the scoring matrix as applied to four basins: Boyd Street, Laurel Commons Carnation Circle, Laurel Commons Old Basin, and the Bey Lea Basin off of Old Freehold Road. Two of the four basins (Boyd Street and Laurel Commons Old Basin) were part of an earlier study conducted by the ALS (*An Analysis of the Pollutant Reduction Capability of Four Targeted, Existing Stormwater BMPs*, ALS 2011).

The trial involved two components: a field visit and a desktop modeling exercise. For each site, the field visit consisted of collecting data and making observations of site characteristic along with conducting some basic ground truthing. In general, most of the site inspections took approximately an hour to complete, was mainly visual inspection, and was intended to:

- Assess/confirm surrounding land use,
- Evaluate the existing status or condition of the subject stormwater facility,
- Locate and identify any infrastructure that could be modified or in need of repair,
- Characterize existing vegetative cover (or lack thereof),
- Provide a basic evaluation of soils, and
- Generate other related information reflective of the facility's maintenance and functionality.

The field visits also provided an opportunity to photo-document each facility's conditions for future reference. Overall, for each site the field visits enabled us to gain a better understanding of the factors that presently affect stormwater management performance or could affect the feasibility of retrofit or upgrade. The visits also provided information that will later be used to formulate basic retrofit/upgrade design concepts.

The desktop analysis is the primary component of the ranking procedure and was used to complete the remainder of the scoring matrix. Although the proper completion of the desktop analysis does require the technical ability to run various pollutant loading models, most of the component analyses are fairly simple and require foremost a familiarity with how to access the required data. For example, Google Earth (<http://www.google.com/earth/index.html>) was used for basic site mapping, including measuring stream lengths and identifying other pertinent site features. Google Earth is a free mapping program that projects high quality aerial photographs over simplified topographic models. This can be used to ascertain landform topography, land use, vegetation, water features, and a host of other information. Certainly

the topographic modeling is especially useful in identifying high points, low points, and other watershed boundaries. A primary data layer is roads, but a variety of other layers can be downloaded and used; an especially useful one is the real-time USGS (United States Geological Survey) stream gaging stations for stage, tidal, and discharge data. For more advanced mapping, NJ-GeoWeb was used (<http://www.nj.gov/dep/gis/geoweblaunch.htm>). This is a web-based GIS (geographic information system) application that can be used to access much of the state GIS data. This application was used specifically in this evaluation to identify USGS Blue Line streams (mapped streams), to determine surface water quality designation, and locate various water quality monitoring stations.

The most complicated aspect of the desktop analysis was determining pollutant loads and projected best management practice (BMP) pollutant removal efficiencies. The first step in this process is the delineation of a watershed boundary for the investigated basin or stormwater management facility. For this, the USGS StreamStats (<http://water.usgs.gov/osw/streamstats/>) web application was utilized. StreamStats is another GIS-based application used to identify a variety of hydrologic and hydraulic data. It is based on algorithms that make use of land use/land cover data (LU/LC), slopes, weather, soils, and USGS stream gaging data. Of particular use for this assessment is the ability to use StreamStats to delineate a watershed from a specified point. In this exercise, this point was the outlet of the investigated basin or stormwater management facility. The resulting delineated area was then used as the watershed area utilized in the pollutant loading models. It should be noted that because storm sewer systems can run against grade (especially when the terrain is relatively flat or highly developed), these delineated watersheds, while potentially subject to some error, do provide a fairly accurate projection of the subject watershed. Once the subject watershed was delineated, it was downloaded as a GIS shape (SHP) file. The StreamStats database also enabled us to examine or confirm a variety of other relevant watershed parameters, especially those pertaining to land use characteristics.

With the watershed of each examined stormwater management facility established, pollutant loading and pollutant removal was modeled using the EPA STEPL model ([http://it.tetrattech.com/stepweb/models\\$docs.htm](http://it.tetrattech.com/stepweb/models$docs.htm)). This is a widely used, relatively simple to run model that incorporates elements of Unit Area Load (UAL) models to generate estimates of pollutant loading. With a few basic inputs concerning the nature of the subject stormwater management facility it can in turn be used to determine the BMP's pollutant removal efficiencies. This is accomplished as follows. First, basic data is input into the model including site location and nearest listed weather station. These are all available in STEPL as simple drop down menus. The site's LU/LC data is entered into the model, using the data from StreamStats. A variety of other conditions are selected including whether an area is sewered (determined from NJ-GeoWeb or NJDEP iMap) and the soil hydrologic group (available through the NRCS Web Soil Survey (WSS) <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>) or accessed through the older SCS County Soil Surveys. The subject BMP was then described. Because this analysis

looked only at existing basins this was as simple as selecting the appropriate BMP type from the STEPL drop down menu. The resulting STEPL model output consisted of:

- Total pollutant load,
- Pollutant removal,
- Pollutant removal efficiency, and
- Discharge pollutant load (total load minus pollutant removal).

In order to ascertain the projected pollutant removal upon retrofit, another STEPL model iteration was run. In this case, the removal effectiveness of the subject stormwater management facility was computed under the retrofitted or upgraded condition. The pre-retrofit and post-retrofit data were then compared. While this is a relatively simple approach, it is also relatively robust and gives a reliable estimate of the magnitude of expected reductions.

The remainder of the scoring matrix is more qualitative in nature and relies on the experience of the investigator using the ranking matrix. This is especially true of general feasibility determinations. Familiarity with permitting processes, design and layout, and cost estimates is crucial, but all applicable information can be accessed via web search, in particular the NJDEP regulations and the New Jersey Stormwater Best Management Practices Manual, as well as other various NJDEP and US Environmental Protection Agency sources. The matrix development document also goes into further detail regarding the choice of the various parameters and how they work in concert to provide a reliable assessment tool.

Overall, the evaluation of this basin scoring matrix and ranking tool has shown the method to be very robust as originally proposed and seems to conform to the general expectations of how it should function. Stated differently, the scoring matrix seems to provide a reliable, objective, and fact-based method to assess basins. While the matrix worked well overall, there are several areas that were modified to improve the function of the tool. The only real functional change was in the projected Nitrogen load reduction metric. In the case of retrofits instead of using straight load reduction of proposed basin types, the more useful metric is calculating the difference in removal rates between current and proposed types. In other words, the retrofit of a basin that does not result in increased pollutant removal has no real benefit, especially when weighed on a cost-benefit scale, which therefore points to the difference rather than absolute value as being the more important metric. Use of percentage was deemed more important when examining retrofits rather than newly constructed basins and thus retrofits are expressed as a percent increase over existing removal rates (increased removal divided by current removal). All other proposed modifications are ones of scale rather than true function. Part of the development of this matrix is to express scores over a wide range of values in order to prevent the development of a central tendency where many scores converge and could limit the use of this tool as a simple assessment tool rather than a more powerful ranking mechanism; the modifications rectify this problem and secure its use as a ranking tool. An upward revision of watershed size was warranted to better cover the range of examined

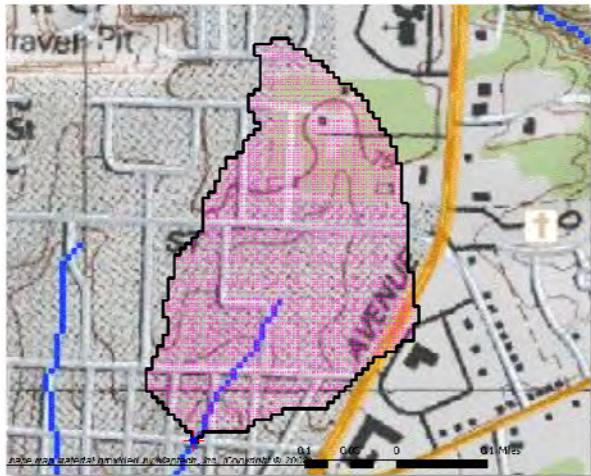
BMPs or potential BMP locations. The projected load removal rates were also revised upward to account for the scale of the basins.

The following section is a brief description of each of the investigated BMPs, photographs, and the BMP scoring. A master table shows the scores for all basins to highlight their differences. Also included at the end of the document is the scoring matrix in its native format.

2.0 Boyd Street Basin

The Boyd Street basin appears to be a dry detention type basin. At this point, there is a fair amount of vegetation in the basin, although it is mostly graminoids with little scrub/shrubs. Some trees are located within the basin proper, but most trees are confined to the berm. Sediment infilling is a problem at the site, as the inlet, an approximately 36" reinforced concrete pipe is about 2/3 buried. There are some floatables in the basin as well. The major design flaw is that the inlet is directly inline with the outlet structure creating a short flow path and thus probably short-circuiting much of the basin. The outlet is a standard grated concrete outlet box.

The proposed remedy is the conversion of this basin to a bioinfiltration system. Certainly, the basin is large enough and the soils conducive to this approach. A key design feature will be the inclusion of a peninsula between the inlet and outlet to force water out into the basin rather than the existing direct hydraulic connection. Some excavation will also be necessary to remove deposited sediment and induce better flow through the storm sewer. Feasibility of this project is high as access is very good and permitting should be minimal.



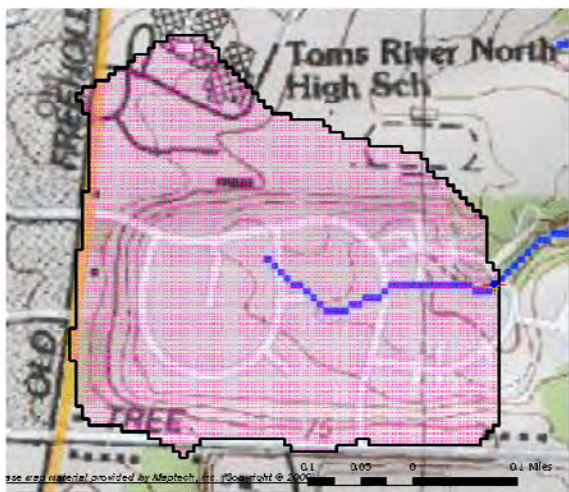
Figures: Boyd Street Basin Watershed and Boyd Street Basin facing southeast

Boyd Street Basin Evaluation			
ID	Ranking Matrix with maximum score	Score	Explanation
1	Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River (5)	1	Approximately 1 mile flow path to Lower Toms River
2	Proximity to NJDEP ASWMN Station (3)	1	Nearest monitoring stations are located within Lower Toms River and of little use in assessing impacts and no data is available
3	NJDEP ranking of affected stream reach (7)	4	Discharges to an unnamed tributary; designated FW2-NT/SE1
4	Land Use and Land Cover characteristics of contributing watershed (10)	10	87.4% Urban Land
5	Watershed Area (4)	3	52.16 acres
6	Projected Nitrogen load reduction based on UAL (10)	10	Projected additional removal attributable to retrofit is 103.7 lbs of N, 100% increase
7	Retrofit vs new construction (7)	7	Retrofit of basin; conversion from dry detention to bioinfiltration
8	Facility on OCPD list of failing basins, or professional judgment assessment by county personnel (5)	5	This is a listed basin and performance is sub-optimal
9	Construction feasibility based on ground-truthing and in-field assessments (8)	8	This is highly feasible, there is good construction access, limited interference from structures/infrastructure, and suitable soils
10	Projected cost (10)	5	Estimate \$80,000 for design, permitting, and implementation
11	Ease of implementation, including NJDEP permit requirements (8)	6	Relatively minor engineering and likely to be encompassed under a General Permit
12	Ease/cost of long-term maintenance (8)	8	Limited maintenance necessary, visual inspections are thought to be adequate may occasionally require removal of floatables
13	Public Acceptance (5)	5	Supported by both Ocean County and the ALS
14	Cost effectiveness relative to estimated load reductions (10)	10	Cost-Benefit Index of 0.82
Sum		83	

3.0 Carnation Circle Basin

The Carnation Circle Basin, located in the Laurel Commons community, is also a dry detention type. Unlike Boyd Street, this basin is a well maintained manicured lawn. Somewhat unusual for a detention basin, but in keeping with its function as an “open-space” lawn area, this area is actually serviced by an irrigation system. The frequent mowing of this area has probably contributed in part to the severe compaction of the basin’s soils. Inflow to this area appears to be limited to one large piped inlet, but there are also stoned swales coming from adjacent parking lots as well as runoff from the roofs, both pipe from the rain spouts and via sheet flow. The engineering plans obtained for this basin confirm that the basin receives inflow from these various sources, not just the primary inflow pipe. This basin drains under Carnation Circle to a grated inlet in a lawn and eventually is discharged to a larger basin that in turn discharges to Long Swamp Creek. That basin was one of the four studied by the ALS as part of the *An Analysis of the Pollutant Reduction Capability of Four Targeted, Existing Stormwater BMPs* project (see Section 4 below).

We propose to convert this basin into a bioretention BMP. Doing so will increase overall pollutant removal efficiency and enhance its aesthetics and reduce total maintenance needs. There is good construction access. Site preparation will require the removal of the irrigation system. Proximity of the basin to adjacent houses is a concern and will require careful hydrologic and hydraulic modeling, soil testing, and plant selection to ensure both the proper function of the converted basin and its integration with the setting.



Figures: Carnation Circle Basin watershed and west side of basin facing north

Carnation Circle Basin Evaluation			
ID	Ranking Matrix with maximum score	Score	Explanation
1	Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River (5)	3	Discharges through another basin and eventually to Long Swamp Creek; flow path is about 0.24 miles
2	Proximity to NJDEP ASWMN Station (3)	1	Nearest monitoring station is WALONG1 on Long Swamp Creek at a distance of approximately 2.55 miles
3	NJDEP ranking of affected stream reach (7)	4	Discharges to an unnamed tributary; designated FW2-NT/SE1
4	Land Use and Land Cover characteristics of contributing watershed (10)	10	96.1% Urban Land
5	Watershed Area (4)	3	76.80 acres
6	Projected Nitrogen load reduction based on UAL (10)	7	Projected additional removal attributable to retrofit is 68.6 lbs of N, 43% increase
7	Retrofit vs new construction (7)	7	Retrofit of basin; conversion from dry detention to bioretention
8	Facility on OCPD list of failing basins, or professional judgment assessment by county personnel (5)	5	This is a listed basin and while not failing performance is sub-optimal
9	Construction feasibility based on ground-truthing and in-field assessments (8)	6	This project is feasible, there is good construction access, but the basin includes an irrigation system and the soils are extremely compacted
10	Projected cost (10)	3	Estimate \$120,000 for design, permitting, materials costs including plants, and implementation
11	Ease of implementation, including NJDEP permit requirements (8)	6	Fairly complicated implementation given proximity to houses and perhaps a slightly higher permit burden, although a General Permit should suffice
12	Ease/cost of long-term maintenance (8)	8	Limited maintenance necessary, probably mostly trash removal and perhaps vegetation management
13	Public Acceptance (5)	5	This project is fully supported by the community association
14	Cost effectiveness relative to estimated load reductions (10)	7	Cost-Benefit Index of 1.89
Sum		75	

4.0 Laurel Commons Detention Basin

The Laurel Commons Detention Basin is located along the northeast margin of the Laurel Commons community within the only forested property at the site. As noted above, this basin was extensively analyzed as part of the ALS's *An Analysis of the Pollutant Reduction Capability of Four Targeted, Existing Stormwater BMPs*. The basin receives all of the stormwater from the townhouses and road of Laurel Commons, including the Carnation Circle Basin. The original design of this basin is somewhat hard to ascertain at this point, but it likely was supposed to function as a dry detention basin. While this basin is probably still providing flow attenuation any other functions are uncertain. Inflow to the basin is conveyed by a large (> 4 ft) oval concrete pipe. The basin is not maintained, and probably has not been so in almost thirty years judging by the trees growing in the basin as well as the amount of silt, leaf litter and debris. There is a large amount of settled sediment in the basin. At the head of the basin, near the mouth of the oval inlet pipe, the settled sediments are mostly fine sands and silts that have formed a large delta. In the central and lower reaches of the basin the settled sediments are mostly highly organic sediments composed of degraded organic fines and leaf pack and other woody debris generated from the adjacent forest. The outlet structure of the basin is a large grated box; the low flow outlet is completely buried and the top grate is also obstructed. A large dam, at least eight feet in height, lies beyond the concrete outlet box and discharges into a small tributary to Long Swamp Creek.

At this point, any work to this basin seems untenable. While not totally infeasible, any actions are severely limited. The first major problem would be access which is limited by steep slopes, forest, and the adjacent townhouses. The quantity of earth moving would be very high given the level of infilling, and any reuse of the material would be extremely limited. Because of the dam, permitting may be problematic. Finally, because of poor soils and the adjacent woodlands any conversion to a basin type integrating infiltration or bioretention is not practical.



Figures: Laurel Commons Old Basin buried and obstructed outlet and inlet sand delta

Laurel Commons Old Basin Evaluation			
ID	Ranking Matrix with maximum score	Score	Explanation
1	Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River (5)	3	Discharges through a first order tributary to Long Swamp Creek; flow path is about 0.09 miles
2	Proximity to NJDEP ASWMN Station (3)	1	Nearest monitoring station is WALONG1 on Long Swamp Creek at a distance of approximately 2.30 miles
3	NJDEP ranking of affected stream reach (7)	4	Discharges to an unnamed tributary; designated FW2-NT/SE1
4	Land Use and Land Cover characteristics of contributing watershed (10)	10	93.4% Urban Land
5	Watershed Area (4)	4	108.8 acres
6	Projected Nitrogen load reduction based on UAL (10)	1	No additional N removal projected upon maintenance
7	Retrofit vs new construction (7)	7	While any project would be classified as a retrofit, in fact it would be closer to heavy maintenance
8	Facility on OCPD list of failing basins, or professional judgment assessment by county personnel (5)	5	This basin is considered failing
9	Construction feasibility based on ground-truthing and in-field assessments (8)	1	This project is not feasible; there are a variety of access and regulatory issues, and poor soils and heavy tree cover limit any other design
10	Projected cost (10)	3	Any work is likely to exceed \$100,000 with continued high maintenance costs
11	Ease of implementation, including NJDEP permit requirements (8)	3	Very complex implementation with complex design, and multiple permits likely to include Dam Safety
12	Ease/cost of long-term maintenance (8)	4	Fairly high maintenance requirements including regular sediment removal with heavy equipment
13	Public Acceptance (5)	3	While not officially opposed at this time there is no active support, and costs and permits would likely raise opposition
14	Cost effectiveness relative to estimated load reductions (10)	1	Because there is no projected N removal increase there is basically no benefit and therefore the Cost-Benefit Index is NA
Sum		50	

5.0 Bey Lea Basin

The Bey Lea Basin is located between Old Freehold Road and the Bey Lea Municipal Golf Course. This is a very large basin with a very large watershed. This basin functions basically as a wet pond surrounded by a shallow aquatic bench. At normal pool stage the basin is approximately 0.65 acres and the bench area is about 0.5 acres. There is also a large upland area upgradient of the pool. The bench is well vegetated with herbaceous wetland plants. The uplands are old field and scrub/shrub with dense patches of cedar. The main inlet is an open channel entering from the southern end. It is approximately fifteen feet wide. There are other concrete outfalls with rip-rap channels originating from the housing development located to the north of the basin. The outlet is a twelve foot tall grated structure that drains via a concrete pipe onto the Bey Lea golf course. This basin appears to function properly, but floatables are an issue as evidenced by litter observed along the basin's eastern shore.

A proposed retrofit for this basin is to convert it to a bioretention system. Overall, this would best be accomplished through a modification of the outlet structure to simply increase the outlet invert. Ideally, given the mostly well drained soils of the site, this would promote increased retention and foster infiltration both through increased retention and expanded wetted footprint. This would be particularly effective for smaller storm events that probably pass rapidly through the current ponded area without much effective treatment. Given the large area of the contributing watershed, detailed hydrologic modeling would be the primary determinant of the feasibility of this basin's conversion from a wet pond to a bioretention system. Major renovation of the basin using heavy machinery is likely to be more harmful at this site because of the existing outstanding vegetation assemblage.

A better solution than the major modification of this basin, other than outlet modification, is to actually install a BMP downstream of the outlet on the golf course. This would provide several advantages: it limits disturbance of what appears to be the current functionality of the basin, it will chain two BMPs together in a treatment train scenario to improve efficacy, it will treat additional stormwater, and it will provide some habitat value. The proposed BMP would consist of a linear biotreatment swale or similar design along the current flow path planted with native vegetation to stabilize the channel and reduce erosion, capture solids, and uptake nutrients. Initial conversations with the course superintendent show this to be feasible as this area is largely out-of-play and this would follow other implemented stormwater management at the course. Additional review of this proposal and details are forthcoming.



Figures: Bey Lea Basin wet pond and outlet structure

Bey Lea Basin Evaluation			
ID	Ranking Matrix with maximum score	Score	Explanation
1	Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River (5)	3	Discharges through a first order tributary to Long Swamp Creek; flow path is approximately 0.24 miles
2	Proximity to NJDEP ASWMN Station (3)	1	Nearest monitoring station is WALONG1 on Long Swamp Creek at a distance of approximately 3.35 miles
3	NJDEP ranking of affected stream reach (7)	4	Discharges to an unnamed tributary; designated FW2-NT/SE1
4	Land Use and Land Cover characteristics of contributing watershed (10)	10	73.9% Urban Land
5	Watershed Area (4)	4	352 acres
6	Projected Nitrogen load reduction based on UAL (10)	4	An additional 130.8 lbs N removal projected upon retrofit, 23% increase
7	Retrofit vs new construction (7)	7	Retrofit of basin; conversion from a wet pond to a bioretention type system
8	Facility on OCPD list of failing basins, or professional judgment assessment by county personnel (5)	1	This basin is deemed to be functioning properly and includes a well-developed vegetative buffer
9	Construction feasibility based on ground-truthing and in-field assessments (8)	6	The feasibility is dependent on H&H modeling since the basin could be considered online, also tampering could disrupt current function
10	Projected cost (10)	5	Estimated cost is \$75,000 much of it for design and permitting, actual implementation is minimal
11	Ease of implementation, including NJDEP permit requirements (8)	3	Complicated implementation with a heavy regulatory burden
12	Ease/cost of long-term maintenance (8)	6	Maintenance is relatively light, but certainly floatables would need to be managed
13	Public Acceptance (5)	3	Opinion is neutral at this point
14	Cost effectiveness relative to estimated load reductions (10)	10	Cost-Benefit Index is 0.69 indicating high benefit if implemented as proposed
Sum		67	

Appendix I

Scoring Matrix for all Basins and Scoring Matrix in Native Format

Master Basin Evaluation					
ID	Ranking Matrix with maximum score	Boyd Street	Carnation Circle	Bey Lea	Laurel Commons
1	Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River (5)	1	3	3	3
2	Proximity to NJDEP ASWMN Station (3)	1	1	1	1
3	NJDEP ranking of affected stream reach (7)	4	4	4	4
4	Land Use and Land Cover characteristics of contributing watershed (10)	10	10	10	10
5	Watershed Area (4)	3	3	4	4
6	Projected Nitrogen load reduction based on UAL (10)	10	7	4	1
7	Retrofit vs new construction (7)	7	7	7	7
8	Facility on OCPD list of failing basins, or professional judgment assessment by county personnel (5)	5	5	1	5
9	Construction feasibility based on ground-truthing and in-field assessments (8)	8	6	6	1
10	Projected cost (10)	5	3	5	3
11	Ease of implementation, including NJDEP permit requirements (8)	6	6	3	3
12	Ease/cost of long-term maintenance (8)	8	8	6	4
13	Public Acceptance (5)	5	5	3	3
14	Cost effectiveness relative to estimated load reductions (10)	10	7	10	1
Sum		83	75	67	50

Scoring Matrix							
Score	1 Proximity to Barnegat Bay, Long Swamp Creek, or Lower Toms River	2 Proximity to NJDEP ASWMN Station	3 NJDEP ranking of affected stream reach	4 Land Use and Land Cover characteristics of contributing watershed	5 Watershed Area	6 Projected Nitrogen load reduction based on UAL	7 Retrofit vs new construction
10				Watershed has greater than 50% Residential, Commercial, Industrial, or other Built-Up lands		New: Removal of more than 800 lbs of N; Retrofit: more than 90% increase	
9						New: Removal of 400 to 800 lbs of N; Retrofit: 70 to 90% increase	
8						New: Removal of 200 to 400 lbs of N; Retrofit: 50 to 70% increase	
7			Discharges to or is directly adjacent to a C1, FW1, or PL	Watershed has between 25 and 50% Residential, Commercial, Industrial, or other Built-Up lands		New: Removal of 100 to 200 lbs of N; Retrofit: 40 to 50% increase	Retrofit
6						New: Removal of 50 to 100 lbs of N; Retrofit: 30 to 40% increase	
5	Directly discharges to specified waterbodies						
4			Discharges to or is adjacent to a 303(d) waterbody or an SE waterbody	Watershed has between 10 and 25% Residential, Commercial, Industrial, or other Built-Up lands	Watershed greater than 100 acres	New: Removal of 20 to 50 lbs of N; Retrofit: 20 to 30% increase	
3	Discharges < 1/2 mile from specified waterbodies	Within 1/4 mile of downstream ASWMN site			Watershed between 10 and 100 acres		
2		Within 1/4 to 1 mile of downstream ASWMN site			Watershed between 1 and 10 acres	New: Removal of 5 to 20 lbs of N; Retrofit: 10 to 20% increase	
1	Discharges >1/2 mile from specified waterbodies	Over a mile from downstream ASWMN site	Discharges to all other waterbodies, primarily FW2	Watershed has less than 10% Residential, Commercial, Industrial, or other Built-Up lands	Watershed less than 1 acre	New: Removal of less than 5 lbs of N; Retrofit: less than 10% increase	New Construction

Scoring Matrix							
Score	8 Facility on OCPD list of failing basins, or professional judgment assessment by county personnel	9 Construction feasibility based on ground-truthing and in-field assessments	10 Projected cost	11 Ease of implementation, including NJDEP permit requirements	12 Ease/cost of long-term maintenance	13 Public Acceptance	14 Cost effectiveness relative to estimated load reductions
10			Less than \$5,000				Cost-Benefit Index less than 1.0
9			\$5,000 to \$10,000				
8		Highly feasible, good access, suitable geotechnical characteristics, adequate area	\$10,000 to \$25,000	Easy implementation, non-permitted or Permit-by-Rule	Limited maintenance, generally low frequency, visual inspections generally adequate		
7							Cost-Benefit Index 1.0 to 2.0
6		Reduced feasibility, impaired access, poor soils, proximity to infrastructure	\$25,000 to \$50,000	Moderate implementation, limited engineering and design, Permit-by-Rule or General Permit	Light maintenance, perhaps quarterly maintenance requiring up to several operators and light equipment		
5	Listed Basin		\$50,000 to \$100,000			Supportive, public at large supports the project, engaged by NGOs	Cost-Benefit Index 2.0 to 5.0
4					Moderate maintenance, requires heavy equipment, multiple operators, and incurs material costs		
3		Poor feasibility, ownership issues, proximity to wetlands, floodplains, and protected landscape features	\$100,000 to \$500,000	Complicated implementation, complex design, multiple permits at State and Federal level, Individual Permits		Neutral, mixed public interest or disinterest, impetus for implementation is mainly municipal	Cost-Benefit Index 5.0 to 10.0
2			\$500,000 to \$1,000,000		High maintenance, requires heavy equipment, strict reporting requirements, and environmental permitting		
1	Non-Listed Basin	Non-feasible, a variety of legal, regulatory, technical, and logistics problems	More than \$1,000,000	Non-implementable, regulations and permitting environment prevent implementation	Continuous maintenance, requires dedicated staff and weekly or daily servicing	Actively opposed by a wide swath of the public, may be opposed by regulators	Cost-Benefit Index greater than 10.0