# New Jersey Stormwater Best Management Practices Manual

February 2004

http://www.state.nj.us/dep/watershedmgt/bmpmanualfeb2004.htm

APPENDIX A

# Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are

permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

# Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Verona

County: *Essex* Date: *4-2-26*

Review board or agency: *Verona Planning Board*

Proposed land development name: *Hillcrest Farms Mixed Use Re-development*

Lot(s): *1* Block(s): *708*

Project or application number:

Applicant's name: *Filoso Family LLC*

Applicant's address: *383 Bloomfield Ave, Verona NJ*

Telephone: 305-297-1009 Fax:

Email address: *Pat @Hillcrestfarms.biz*

Designer's name: *Anderson Consulting Services LLC*

Designer's address: *40 Miller Drive, Boonton NJ 07005*

Telephone: *973-975-0703* Fax: *973-975-0703*

Email address:*pandersonpe@gmail.com*

# Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach and strategies incorporated into the proposed site's design. Attach additional pages as necessary. Details of each nonstructural strategy are provided in Part 3 below.

*The Hillcrest Farms project proposed to re-develop the property located on the corner of Park Ave and Bloomfield Ave. in Verona. The property is fully developed with a landscape nursery with no natural area present onsite. The re-development of the property will include a green buffer around the perimeter of the property and a stormwater management system that will greatly improve the quality and quantity of stormwater from the site.*

*The approach to the stormwater design starts with an increase in the time of concentration for the site with green buffers around the perimeter, planted with native non-invasive plants that will reduce discharge from the current fully developed condition. The project will have porous pavement onsite to provide water quality. Porous pavement with underdrains is listed as green technology for water quality in the BMP manual and the municipal stormwater ordinance. The porous pavement underdrains and inlets will discharge to a subsurface detention system with outlet control which will control the rate of discharge to meet the discharge rate reduction requirements of the Stormwater ordinance. This reduction in rate of flow will reduce the impact of the site on the municipal stormwater system.*

*Per the Municipal stormwater ordinance developed sites are not required to meet the groundwater re-charge standards. The soil conditions onsite are suitable for recharge with porous native material encountered below the surface layers and no groundwater encountered in test pits up to 16 ft deep. The design challenge with providing recharge to groundwater comes with the mounding of groundwater. Initial designs with the entire underground system allowing recharge created a groundwater mounding impact on the property to the South. The amended design includes a section of the detention pipe to be porous, allowing some recharge to groundwater. The porous section of pipe is located away from the property to the south eliminating the mounding impact.*

*Also included in the project design but not quantified in the drainage calculations is a section of green roof on the building and the use of a cistern to collect rainwater to irrigate the green buffer.*

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

*Verona Stormwater Control Ordinance*

Do regulations include nonstructural requirements?
Yes: No: *x*

If yes, briefly describe: *Green technology per ordinance and state standards is required*

List LID-BMPs prohibited by local regulations: *NA*

Pre-design meeting held? Yes: Date: No: *x* *Site inspection by design engineer without municipal attendance*

Meeting held with: *NA*

Pre-design site walk held? Yes: *x* Date: No: *By design engineer*

Site walk held with: *NA*

Other agencies with stormwater review jurisdiction:

Name: *HEP SCD*

Required approval: *Soil Erosion and Sediment Control*

Name: *Essex County*

Required approval: *County Planning board approval for Bloomfield Ave Modifications*

Name:

Required approval:

# Part 3: Nonstructural Strategies and LID-BMPs in Design

## 3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: *x* No:

If yes, was this inventory a factor in the site's layout and design? Yes: No: *x* *The limited existing inventory did not impact the site layout as the existing planting are primarily around the perimeter which will remain green.*

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: No: *x*
If yes, specify % of site: *the existing lot has no natural areas to preserve*

Native ground cover? Yes: No: *x*
If yes, specify % of site:

Vegetated buffers? Yes: *x* No:
If yes, specify % of site: *23.6%*

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: *x* No:
If yes, specify % of site: *0 % existing, the existing lot has no natural areas to preserve*

Native ground cover? Yes: No: *x*
If yes, specify % of site:

Vegetated buffers? Yes: *x* No:
If yes, specify % of site: 23.6%

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient:
Yes: No: *x* *Vegetative filter strips are not proposed. Stormwater collected though porous pavement*

Reduce runoff pollutant loads through runoff treatment:
Yes: *x* No: *Porous Pavement, 80% suspend solid removal*

Maintain groundwater recharge by preserving natural areas:
Yes: No: *x* *There are no native areas to preserve but the addition of native plantings in a vegetative buffer will increase the groundwater recharge from the current conditions*

## 3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed?
Yes: *x* No:

If yes, were these inventories factors in the site's layout and design? Yes: No: *x* *The site is fully developed with a layer of fill over the native soils. Most of the surface conditions encountered were asphalt or packed gravel with limited surface permeability*

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners?
Yes: No: *x* *The permanent disturbance is the building and pavement proposed for approval by the planning board. Although there is not a restriction on modification to the plannings in the green buffer it is unlike they can change without an amended board approval*

If yes, how:

Restrict temporary site disturbance during construction?
Yes: No: *x*

If yes, how:

Consider soils and slopes in selecting disturbance limits?
Yes: No: *x* *There are no steep slopes onsite and only one soil type. Avoidance of soils and slopes was not a factor in the layout*

If yes, how:

C. Specify percentage of site to be cleared: *0 %* Regraded: *100 %* *The site will be cleared of buildings and pavement and regraded for the proposed project*

D. Specify percentage of cleared areas done so for buildings: *39%*

For driveways and parking: *37.4%* For roadways: *NA*

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above? *The project meets the redevelopment zone bulk requirements. Since the property is currently fully developed and the proposed improvements improve environmental conditions with a green buffer, and porous pavement.*

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: HSG B: HSG C: *x* HSG D:

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: HSG B: HSG C: *76.4%* HSG D:

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

*None, One soil group onsite so it does not factor into the design*

I. Does the site include Karst topography? Yes: No: *x*

If yes, discuss measures taken to limit Karst impacts:

## 3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: *67.9%* Proposed: *76.4%*

B. Specify maximum site impervious coverage allowed by regulations: *80%*

C. Compare proposed street cartway widths with those required by regulations: NA, No streets are proposed

| Type of Street | Proposed Cartway Width (feet) | Required Cartway Width (feet) |
|---|---|---|
| Residential access – low intensity | | |
| Residential access – medium intensity | | |
| Residential access – high intensity with parking | | |
| Residential access – high intensity without parking | | |
| Neighborhood | | |
| Minor collector – low intensity without parking | | |
| Minor collector – with one parking lane | | |
| Minor collector – with two parking lanes | | |
| Minor collector – without parking | | |
| Major collector | | |

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: *9x18* Regulations: *9x18*

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: *63* Regulations: *63*

F. Specify percentage of total site impervious cover created by buildings: *39%*

By driveways and parking: *37.4%* By roadways: *n/a*

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

*The project follows the bulk requirements of the redevelopment zone and improves the conditions with a native planted vegetative buffer and porous pavement. The porous pavement is counted as impervious despite it being porous.*

H. Specify percentage of total impervious area that will be unconnected:

Total site: *0%* Buildings: Driveways and parking: Roads:

*All sections of the roof and pavement are piped direction to the stormwater system to manage discharge rate. The roof water is considered clean and the porous pavement is green technology for water quality. The recharge section of pipe added to the detention system will achieve the recharge intended with unconnected areas*

I. Specify percentage of total impervious area that will be porous:

Total site: *61%* Buildings: *0* % Driveways and parking: *100%* Roads: *NA*

J. Specify percentage of total building roof area that will be vegetated: *5%*

K. Specify percentage of total parking area located beneath buildings: *38%*

L. Specify percentage of total parking located within multi-level parking deck: *0%*

## 3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: *8%* Vegetated swale: Natural channel:

Stormwater management facility: *67* Other: *25% overland flow*

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

*The project meets the bulk zoning requirements of the redevelopment zone. It employes green technology that fits with the zone standards that permit 80% impervious cover*

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: *The project minimizes onsite slopes in the current design and requires retaining walls to makeup the vertical change at the downhill side of the site*

Increase overland flow roughness: *The project proposes a significant native planning area to increase roughness and encourage infiltration. The porous pavement proposed onsite drains vertically making roughness increases less important.*

## 3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: *3*

Specify the spacing between the trash receptacles: *45 ft*

Compare trash receptacles proposed with those required by regulations:

Proposed: *3* Regulations: *0*

B. Pet Waste Stations

Specify the number of pet waste stations provided: *1*

Specify the spacing between the pet waste stations: *n/a*

Compare pet waste stations proposed with those required by regulations:

Proposed: *1* Regulations: *0*

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: *100%*

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: *Bi-annually* Regulations: -

Litter collection: Proposed: *Weekly* Regulations: -

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

*Trash rack in outlet structure to be regularly maintained. Head pieces on inlets restrict trash washing into system*

E. Prevention and Containment of Spills No know sources of contaminants are proposed on site

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff:

Pollutant: *NA* Location:

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: Location:

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: Location:

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: Location:

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: Location:

# Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

| No. | Nonstructural Strategy | Yes | No |
|---|---|---|---|
| 1. | Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss. | *x* | |
| 2. | Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces. | | *x* |
| 3. | Maximize the protection of natural drainage features and vegetation. | | *NA* |
| 4. | Minimize the decrease in the pre-construction time of concentration. | *x* | |
| 5. | Minimize land disturbance including clearing and grading. | *NA see above* | |
| 6. | Minimize soil compaction. | *x* | |
| 7. | Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides. | *x* | |
| 8. | Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas. | | *x* |
| 9. | Provide preventative source controls. | *x none proposed* | |

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

*The re-development of this property follows the redevelopment zone bulk standards which includes up to 80% impervious coverage. Since the site is currently fully developed and there are essentially no natural conditions that are beneficial in stormwater management, the improvements proposed are a substantial improvement from a stormwater perspective. Due to the density of development permitted in the zone some Green Infrastructure stormwater methods do not work well with the site. The project does employ green infrastructure of porous pavement, green roof and a vegetative buffer with native low maintenance plants to achieve conformance with the ordinance requirements.*