Detention Basin Retrofit

Moses Milch Drive, Howell, New Jersey

Project Description

This project involves converting an existing detention basin to a bioretention/infiltration basin. The existing detention basin receives runoff from the residential development along Moses Milch Drive. It is identified as "GR-4" by the Stream Visual Assessments. Although the basin appears to be functioning properly, converting the basin to a bioretention basin will allow for enhanced treatment of runoff and increased infiltration, particularly for the smaller storm events.

A summary of the major construction items are as follows:

- Modify/remove the existing low flow channel;
- Conduct soil decompaction throughout the basin;
- Install subgrade within basin;
- Replace existing outlet structure;
- Plantings throughout basin;
- Education signage near inlet of basin

Key Project Features

- Enhanced treatment of runoff
- Promotes infiltration
- Basin retrofit
- HUC14: NB5

Significant Assumptions & Recommended Pre-Design Investigation Activities

As this is a conceptual level design, there are a number of assumptions which have been made to this project.

Permeability – it is assumed that the soil can infiltrate at a rate such that the stormwater quality design storm runoff volume is drained within 72 hours. Soils at this site are classified as "Berryland sand, 0 to 2 percent slopes, frequently flooded". They have a hydrologic group classification of "B/D". Group B soils are generally moderately well drained and the saturated hydraulic conductivity ranges from 1.42 inches per hour to 5.67 inches per hour (USDA, 2007). The dual classification to include Group D is due to an assumed water table depth of less than 24 inches from the surface. This is due to the presence of Gravelly Run, located immediately adjacent to the detention basin.

The original drawing showing the grading plan of this basin was obtained from Howell Township. The drawing indicated a proposed basin liner, potentially due to the Group D classification. The drawing notes indicate that the basin liner is to be composed of 40 mil high density polyethylene (HDPE). If that liner did in fact exist, then converting this basin to a bioretention/infiltration basin would not be feasible since infiltration to the aquifer would not occur through the liner.

In order to investigate the presence of a liner and the depth to water, four holes were dug within the basin in November and early December 2012. The first hole that was dug was located in the middle of the basin to a depth of 4 feet. That hole did not reveal the presence of a liner. In addition the hole was dry, indicating that the water table was deeper than 4 feet from the surface. Two additional holes were dug within the basin to a depth of 3 feet which

Conceptual Project Cost:
$400,000

also did not indicate the presence of a liner. The water table was not encountered in those holes either.

Based on the test pits that were dug, it is assumed that the liner does not exist under the basin and that the depth to water is beyond 4 feet. However, the seasonal high water table is not known at this location.

The basin drawings also indicate underdrains were installed in the basin. Further investigation of these underdrains and the discharge location(s) will be required. If these underdrains exist and discharge unrestricted to Gravel Run, that could detract from the retention effectiveness.

Because of the uncertainty associated with the seasonal high water table, it is recommended that a piezometer be installed in the center of the basin. Also, it is recommended that an infiltration test be conducted at several locations throughout the basin both pre and post soil decompaction activities.

Water table mounding – it is assumed that infiltration of stormwater runoff at this location will not create an excessively high water table mounding condition which could impact surrounding homes. Additional investigations should be conducted to verify this assumption. The piezometer installed within the basin to confirm seasonal high water table can continue to be monitored if mounding is a concern. Installation and monitoring of an additional piezometer located outside the basin is also recommended.

Potential Alternatives to Conceptual Design

This conceptual design calls for the removal of 400 linear feet of the low flow channel. The amount of channel which is removed is subject to change, pending different design alternatives. For example, the channel may be modified to distribute runoff throughout the basin either through the use of small dams along the channel, perforating the channel, or a combination of both.

The conceptual planting plan and layout is subject to change.

Site Photographs

Entrance to basin, looking south from Moses Milch Drive. Potential location for educational signs

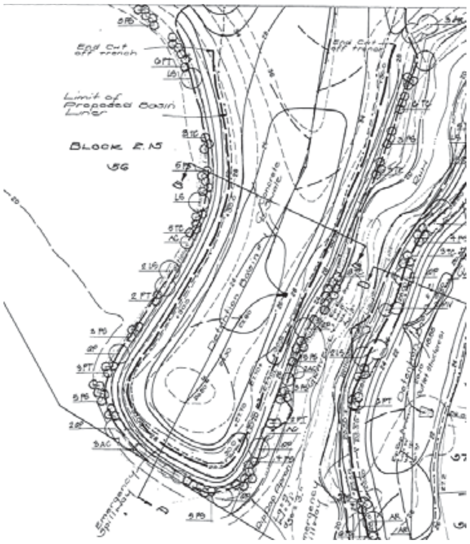
Low flow channel

Looking north at detention basin

Inlet from Moses Milch Drive

Outlet to Gravelly Run (buried)

Outlet orifice



Section from grading plan indicating proposed basin liner.

Test pit locations

Photograph of test pit showing dry conditions and no evidence of a basin liner

Depth of test pit was approximately 4 feet

Basin Retrofit

Remove low flow channel or install dams within flow channel to force stormwater onto grass area.

Supplemental planting.

Soil decompaction within basin

Modify outlet structure

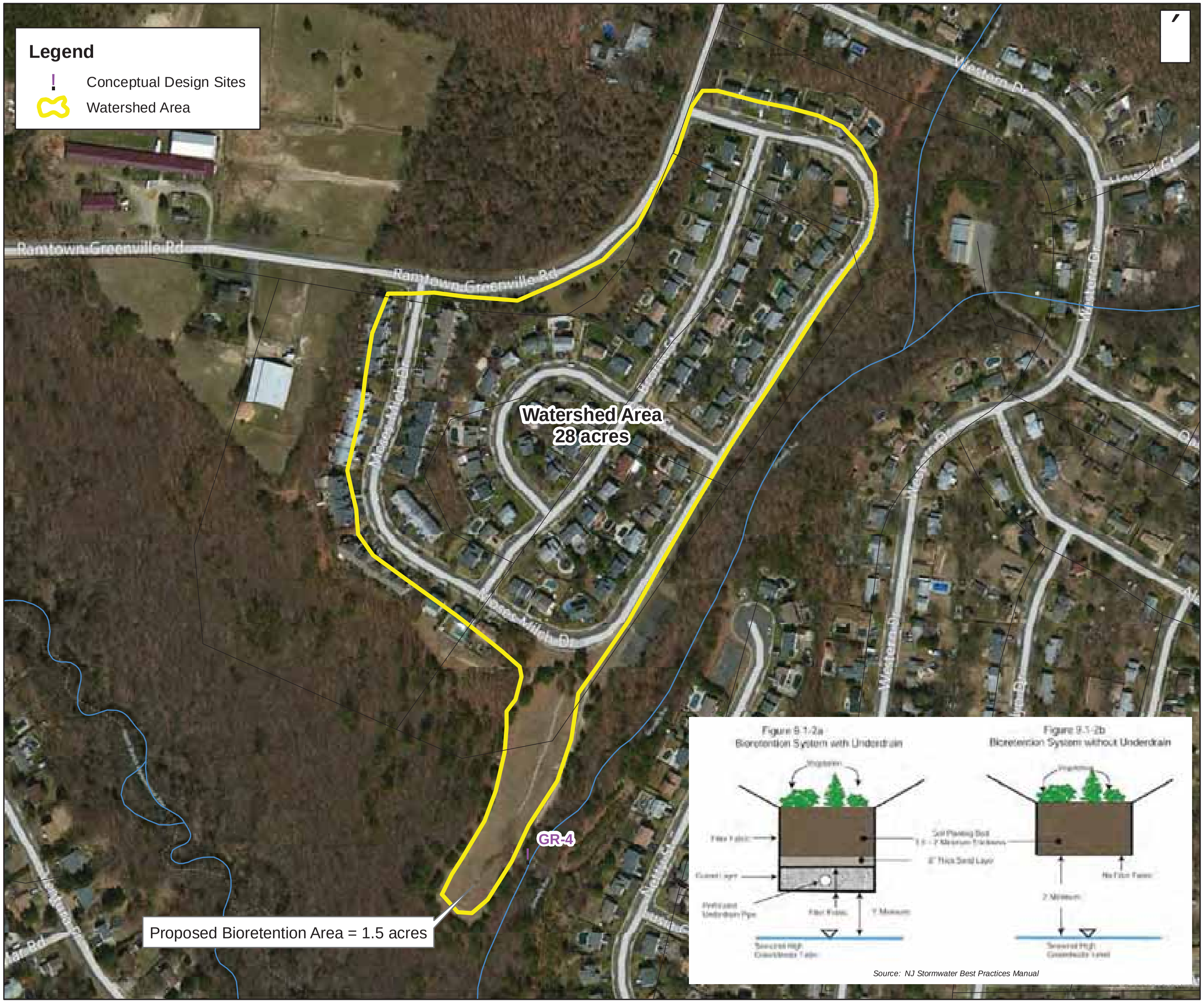
***May also want to consider retrofitting outlet structure from basin located off of Netty Street (east of stream).**

Basis for Selection:

1. **Large basin that captures a large volume of residential runoff.**
2. **BMPs would promote infiltration & water quality.**
3. **Relatively simple to retrofit.**
4. **Removed from residential view. Short periods of standing water should not result in complaints.**

Stormwater Basin off of Moses Milch Drive
Visual Assessment Site GR4
Howell, New Jersey

BRICK UTILITIES
CDM Smith
John S. Truhan Consulting Engineers, Inc.



Proposed Site: GR-4
Location: Howell, New Jersey
Project: Bioretention Area off Moses Milch Drive

Conceptual Design Notes:

1. Remove existing low flow concrete channel (approximately 400 feet)
2. Apply soil decompaction throughout the bioretention area footprint.
3. Install subgrade within area of channel as appropriate per Figure 9.1-2, based on soil testing during design.
4. Remove existing outlet structure; replace with concrete box structure with orifice drain and weir overflow structure.
5. Discharge pipe should be a minimum of 15" diameter and approximately 40-feet long.
6. Install a mixture of native trees across the basin bottom.
   a. Willow Oak (Quercus Phellos)
   b. Sweetgum (Liquidambar Styraciflua)
   c. Red Maple (Acer Rubrum)
   d. Pitch Pine (Pinus Rigida)
   e. Loblolly Pine (Pinus Taeda)
7. Install education signage on Moses Milch Drive near inlet to bioretention area.

1 inch = 250 feet

0 125 250 500 Feet

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Proposed Site: GR-4
Location: Howell, New Jersey
Project: Bioretention Area off Moses Milch Drive

Conceptual Planting Plan:

1. Place trees in perimeter zone as shown (perimeter length = 1,200 feet)

2. Install a mixture of native trees from the following list.
   a. Willow Oak (Quercus Phellos)
   b. Sweetgum (Liquidambar Styraciflua)
   c. Red Maple (Acer Rubrum)
   d. Pitch Pine (Pinus Rigida)
   e. Loblolly Pine (Pinus Taeda)

3. Shrubs and herbaceous species should be placed in the wetter zones.

4. The number of stems per acre should average 1,000 with tree spacing of 12 feet and shrub spacing of 8 feet. (typical wet zone = 0.70 acres)

5. Refer to the New Jersey Stormwater BMP Practice Manual, Chapter 7, for more information on vegetation.

1 inch = 60 feet

0 30 60 120 Feet

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