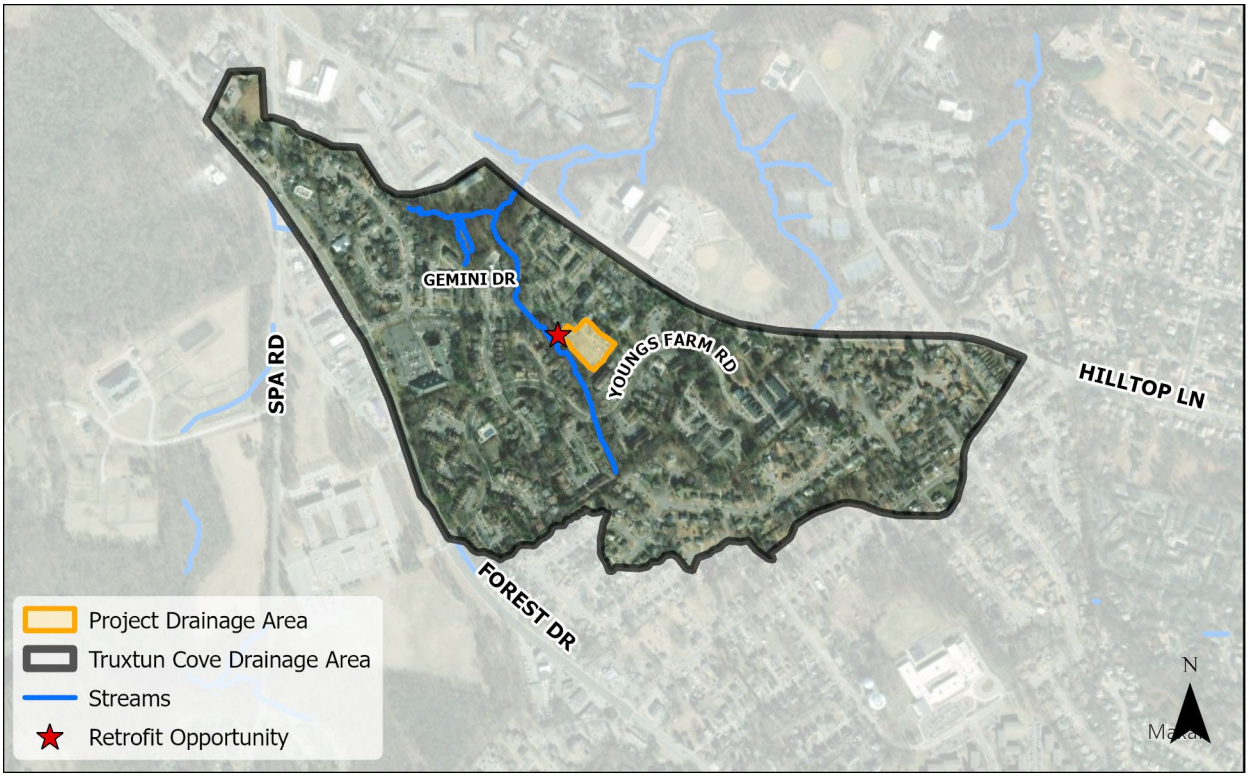
TRUXTUN COVE UPLAND ASSESSMENT

North Green Tennis Court: Submerged Gravel Wetland

FINAL Concept



Location: 302 Hilltop Lane, Annapolis, MD
Property Ownership: Private (North Green Homeowners Association)
Assessment Date: 10-18-2022
Drainage Area: 47,281 square feet, 33,202 square feet Impervious (70%), Residential land use
Proposed Restoration Project: Submerged Gravel Wetland
Targeted Stormwater Criteria (Goals):

- Improve water quality
- Increase water storage along watershed flow paths
- Attenuate peak discharges
- Improve biology and ecology
    - Provide pollinator habitat
    - Reduce presence of non-native invasive species
    - Improve aesthetics
    - Enhance public access to a diverse assemblage of plants

Targeted Practice Area/Available Area: 2,670 square feet/7,000 square feet
Targeted Water Quality Volume/Provided Storage: 2,687 cubic feet/2,670 cubic feet
Impervious Cover Treated (Percent of Total WQv): 0.76 acres (100%)
Pollutant Load Reduction: 11.9 lbs/yr TN, 1.8 lbs/yr TP, 5,880 lbs/yr TSS
Draft Design Completion Cost Estimate: $70,956.80
Draft Construction Cost Estimate $214,363.49

The proposed stormwater retrofit is located at a remnant tennis court facility within the North Green Condominium neighborhood in Annapolis, MD. The remnant tennis court is bound by an existing stream channel to the southwest, Gemini Drive to the north, condominiums to the east, and an existing parking lot to the southeast. An existing tree line follows the length of the tennis court to the southwest as well as several invasive species such as English ivy.

Stormwater infrastructure surrounds the tennis court to the north, east, and south but does not directly run through the facility. Sanitary sewer infrastructure runs underneath at the northwest portion of the remnant tennis court, while underground electrical lines supporting light poles were identified along the parking lot to the southeast. The surrounding soils are classified as C soils indicating a slow infiltration rate when thoroughly wet.

Restoration Goals and Methods

The goal of the submerged gravel wetland is to capture stormwater runoff from the surrounding impervious areas to increase water storage, improve water quality, and attenuate peak discharges before returning to the stormdrain network. Additional goals include reducing the presence of non-native invasive species, improve aesthetics, and enhance public access to a diverse assemblage of plants.

A submerged gravel wetland is filtering practice using wetland plants and rock media to capture stormwater runoff and remove pollutants via biological uptake from algae, bacteria, and plants. These systems work best in areas with poorly drained soils. This practice is designed as a horizontal flow-through treatment cell, preceded by a sedimentation basin (forebay). Standing water of significant depth is not expected other than during large rainfall events. The wetland soils are continuously saturated below the ground surface to promote water quality treatment conditions and support wetland vegetation. Precipitation events larger than the water quality volume will have some portion that overflows to the nearby stream channel through an emergency spillway.

Stormwater currently flowing into the stormdrain network from the existing parking lot to the southeast would be redirected into the submerged gravel wetland and discharge back into the stormdrain network to the north. Given the large area, the submerged gravel wetland could take on additional stormwater inputs from residential areas to the southeast that currently discharge directly into the stream adjacent to the retrofit facility.

Operation and Maintenance

The following items should be addressed to ensure proper maintenance and long-term performance of the submerged gravel wetland (Source: Maryland Stormwater Design Manual, Chapter 5, 2009):

- During the first year of operation, inspections should be conducted after every major storm and poorly established areas revegetated.
- Sediment accumulation in the pretreatment areas should be removed as necessary.
- Signs of uneven flow distribution within the wetland may mean that the gravel or underdrain.
- is clogged. The gravel and/or underdrain may need to be removed, cleaned, and replaced.
- A dense stand of wetland vegetation should be maintained through the life of the facility with plantings replaced as needed.

- Inlets and outlets to each submerged gravel wetland cell should be free from debris to
- prevent clogging.
- Erosion at inflow points should be repaired.
- Flow splitters should be functional to prevent bypassing of the facility.

Restoration Feasibility Summary

Access:	Gemini Drive
Staging:	Tennis court, Parking lot
Land Ownership:	Unknown – assuming North Green Condominium
Environmental Resources:	Mature trees
Utilities:	Sanitary Sewer, Underground electric (i.e., light poles)
Other Constraints:	N/A

Submerged Gravel Wetland Examples

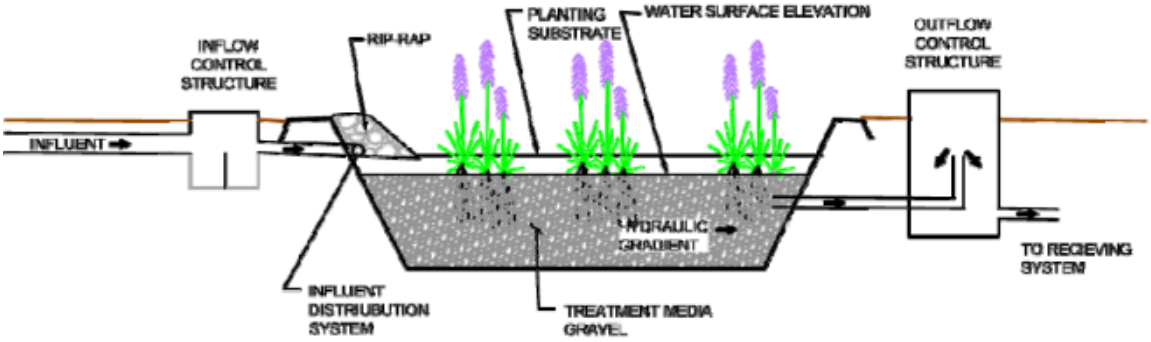


Figure 1. Submerged gravel wetland section (Source: Maryland Stormwater Design Manual, Chapter 5, 2009).

Figure 2. Example of submerged gravel wetland in Washington, D.C.

Existing Site Condition Photos

Photo 1. Remnant tennis court looking southeast toward existing North Green Condominium.

Photo 2. Remanent tennis court looking southeast toward existing parking lot with existing tree line to the southwest.

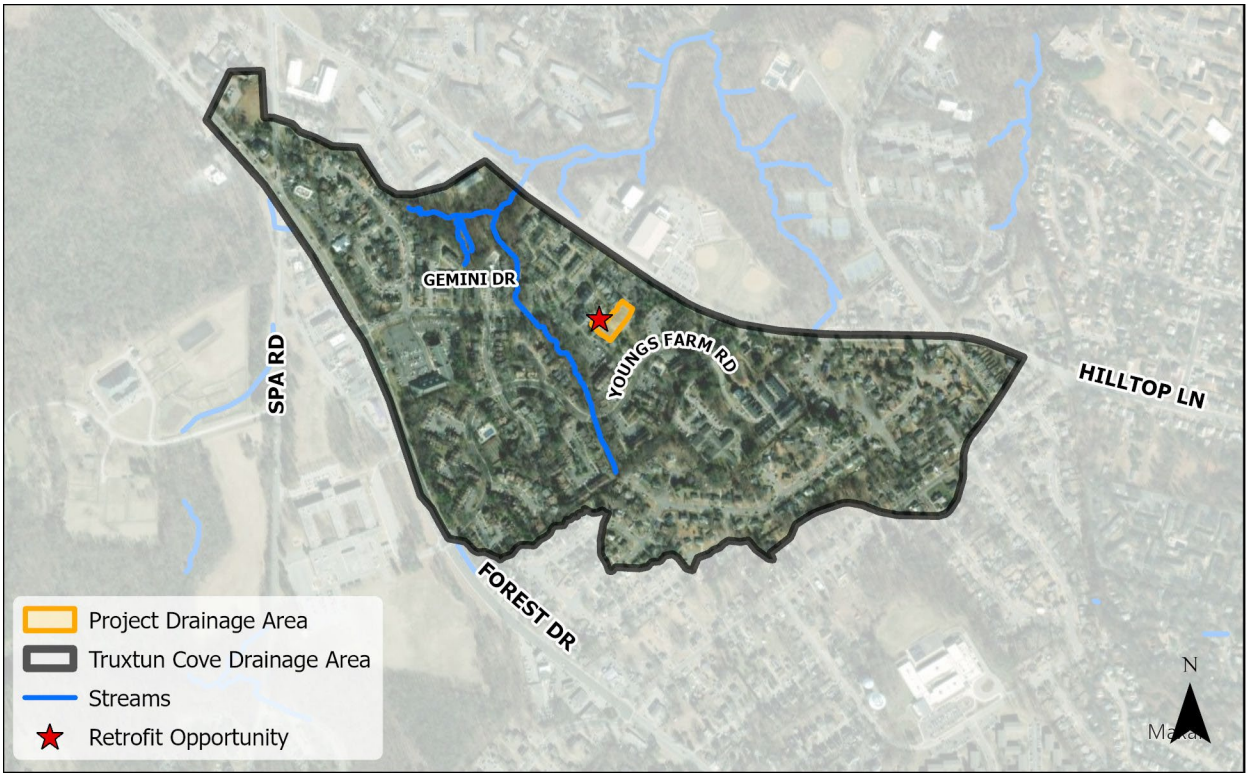
Photo 3. Looking northwest toward the invasive species and tree line to the southwest of the remanent tennis court.

Photo 4. Looking northeast toward existing North Green Condominium with existing parking lot to the southeast and the remnant tennis court to the northwest.

TRUXTUN COVE UPLAND ASSESSMENT

North Green Pool: Bioretention

FINAL Concept



Location: 302 Hilltop Lane, Annapolis, MD
Property Ownership: North Green Condominium Association
Assessment Date: 10-18-2022
Drainage Area: 23,140 square feet, 11,848 square feet Impervious (51%), Residential land use
Proposed Restoration Project: Bioretention
Targeted Stormwater Criteria (Goals):

- Improve water quality
- Increase water storage along watershed flow paths
- Attenuate peak discharges
- Improve biology and ecology
    - Provide pollinator habitat
    - Improve aesthetics
    - Enhance public access to a diverse assemblage of plants

Targeted Practice Area/Available Area: 971 square feet/971 square feet
Targeted Water Quality Volume/Provided Storage: 985 cubic feet/1,005 cubic feet
Impervious Cover Treated (Percent of Total WQv): 0.27 acres (100%)
Pollutant Load Reduction: 5.5 lbs/yr TN, 0.9 lbs/yr TP, 2,517 lbs/yr TSS
Draft Design Completion Cost Estimate: $69,231.80
Draft Construction Cost Estimate: $101,696.76

The proposed stormwater retrofit is located within an existing swale that surrounds the community pool facility in the North Green Condominium neighborhood in Annapolis, MD. The pool area is bound on all four sides by existing condominium buildings. The area is mostly turf with some isolated trees. All of the trees are in poor condition and will be removed.

The proposed bioretention surrounds the pool to the north, east, and south and is located within an existing swale. An existing storm drain outfall is located on the southwest side of the pool and will be used to capture overflow from the micro-bioretention. Underground electrical lines supporting light poles were identified along the adjacent sidewalk. The surrounding soils are classified as C soils indicating a slow infiltration rate when thoroughly wet.

Restoration Goals and Methods

The goal of the bioretention is to capture stormwater runoff from the surrounding impervious areas to increase water storage, improve water quality, and attenuate peak discharges before returning to the existing storm drain network. Since this stormwater management practice will be planted with native plants, this will provide pollinator habitat.

Another goal is for this practice to serve as an educational opportunity for residents and locals. Signage can be posted to educate the residents on the benefits of stormwater controls. Well established plantings above ground will showcase how native plants can help in pollution control and promote wildlife and pollinator habitats.

A bioretention is a filtering practice using plants, soil media and stone to capture stormwater runoff and remove pollutants through settling, soil adsorption, and microbiological and plant uptake. Stormwater currently passing into the existing swale includes runoff generated from sidewalks, the pool deck, and rooftops. An underground pipe at the bottom of the practice will allow drainage to flow through the system and will take excess drainage into the existing storm drain system. An overflow device in the system will allow drainage during larger storm events to bypass the system and safely pass into the storm drain system. The design should include planting of an eroded slope on the northeast side of the pool.

Operation and Maintenance

The following items should be addressed to ensure proper maintenance and long-term performance of the bioretention (Source: Maryland Stormwater Design Manual, Chapter 5, 2009):

- During the first year of operation, inspections should be conducted after every major storm and poorly established areas revegetated.
- Sediment accumulation should be removed as necessary.
- Signs of uneven flow distribution within the bioretention may mean that the filter media or underdrain is clogged. The underdrain may need to be removed, cleaned, and replaced.
- A dense stand of native vegetation should be maintained through the life of the facility with plantings replaced as needed.
- Inlets and outlets should be free from debris to prevent clogging.
- Erosion at inflow points should be repaired.

Restoration Feasibility Summary

Access:	From a parking lot drive aisle off Gemini Drive
Staging:	Parking lot on the abandoned tennis court
Land Ownership:	North Green Condominium Association
Environmental Resources:	4 individual trees in poor condition
Utilities:	Underground electric (i.e., light poles)
Other Constraints:	Small area of erosion on steep slope on NE corner; should include planting in design to mitigate

Bioretention Examples

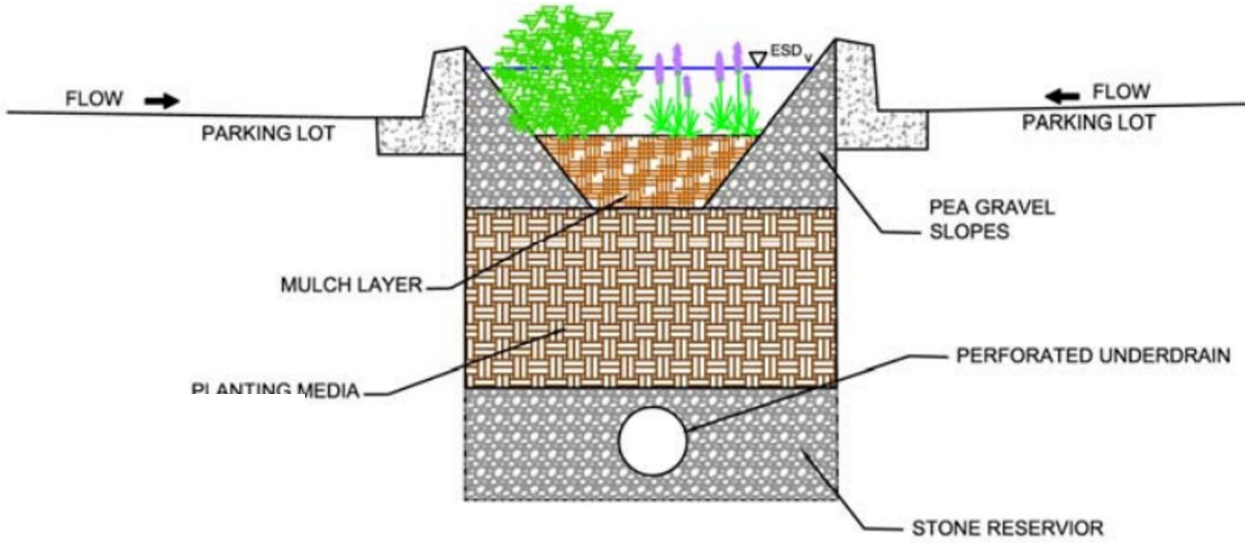


Figure 1. Example bioretention section (Source: Maryland Stormwater Design Manual, Chapter 5, 2009)

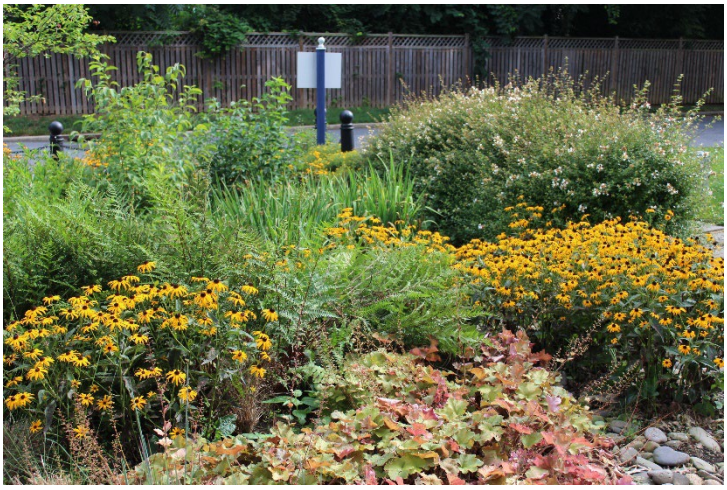


Figure 2. Example of bioretention in Annapolis

Existing Site Condition Photos

Photo 1. Existing swale on the south side of pool.

Photo 2. Existing swale on the east side of pool.

Photo 3. Eroded slope on northeast side of pool.

Photo 4. Existing inlet to be converted to proposed overflow.