Cabin Branch Stormwater Management Retrofit Projects

Quail Valley Pond #1
Quail Valley Pond #2
Strawberry Knoll Facility

Department of Environmental Protection
Montgomery County Maryland

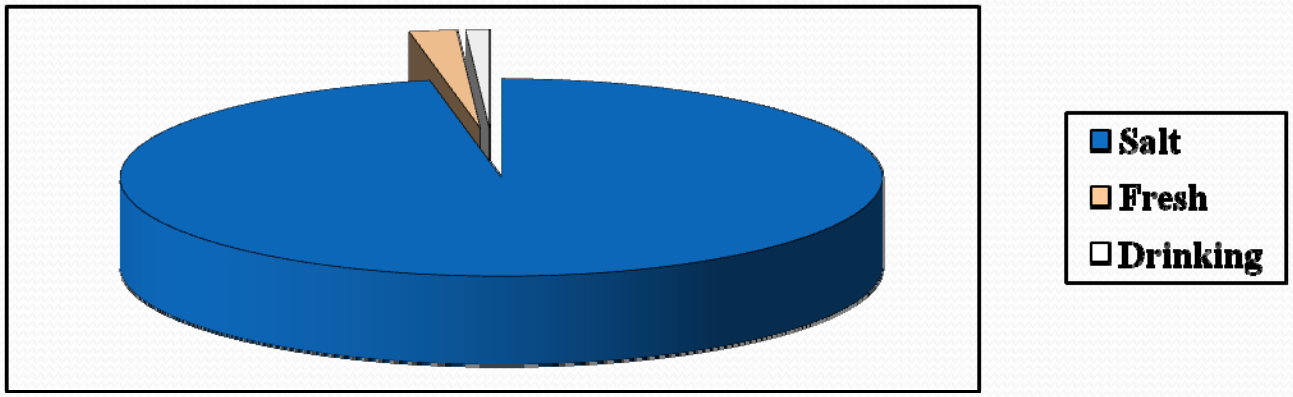
Concept Design Presentation
February 11, 2014

Biohabitats
CENTURY ENGINEERING

Today's Agenda

- Sources of Water on Earth
- Montgomery County background
- What is a Watershed & Runoff?
- Intro to Stormwater
- What the County is Doing to Protect Our Streams
- Goals of the Project
- Proposed Pond Retrofit
- Questions/Comments

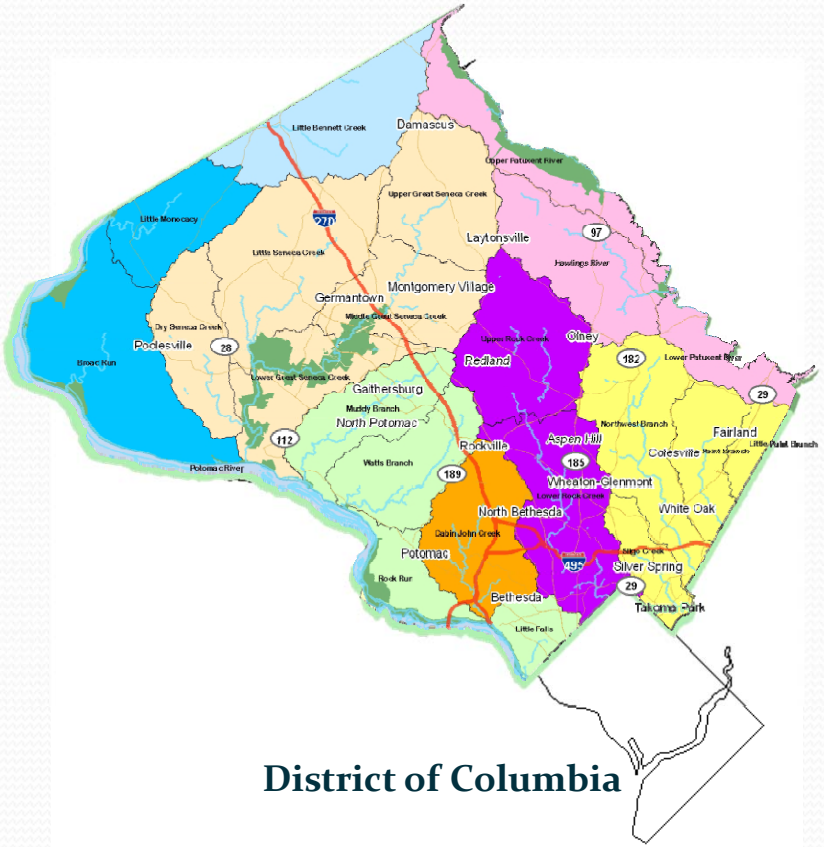
Sources of Water



- About 97% is salt water
- About 2% is frozen
- Only 1% is available for drinking water
  - Across the country, most potable water is from groundwater
  - In Maryland, most is from surface water
- Potential for greater impacts from runoff in Maryland

Montgomery County, MD

- 500 sq. miles
- 970,000 people
  - Second only to Baltimore City within Maryland in average people per square mile
  - 184 languages spoken
- About 12% impervious surface overall
  - About the size of Washington DC
- Over 1,500 miles of streams
- Two major river basins:
  - Potomac
  - Patuxent
- Eight local *watersheds*



Impervious: Not allowing water to soak through the ground.

What is a Watershed?

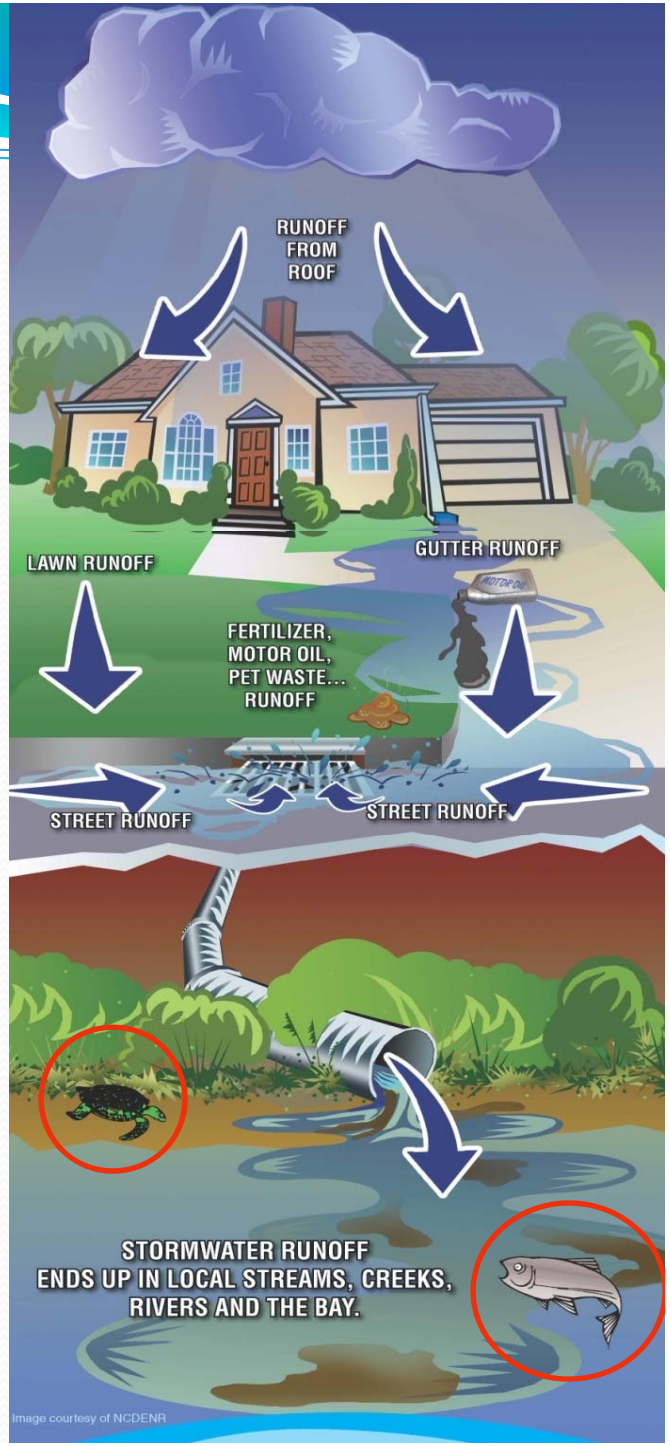
- A ***watershed*** is an area from which the water above and below ground drains to the same place.
- Different scales of watersheds:
  - Chesapeake Bay
  - Eight local watersheds
  - Neighborhood (to a storm drain)

What is Runoff?

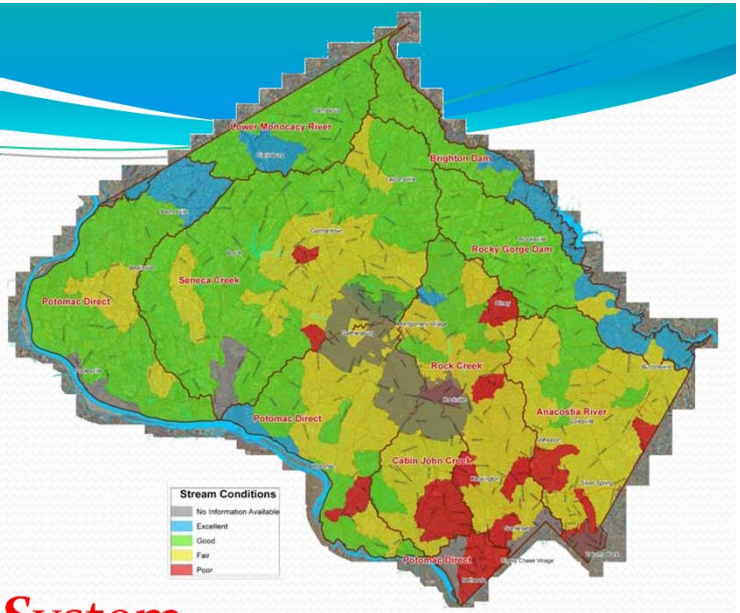
Water that does not soak into the ground becomes surface runoff. This runoff flows over hard surfaces like rooftops, driveways and parking lots collecting potential contaminants and flows:

- **Directly into streams**
- **Into storm drain pipes, eventually leading to streams**
- **Into stormwater management facilities, then streams**

<u>Two Major Issues:</u>
Volume/Timing of Runoff
Water Quality



What is the County doing to protect our Streams?



- Must meet regulatory requirements
  - Federal Clean Water Act permit program
  - **MS4** = **M**unicipal **S**eparate **S**torm **S**ewer **S**ystem
- Applies to all large and medium Maryland jurisdictions
- County programs
  - Restore our streams and watersheds
    - Add runoff management
  - Meet water quality protection goals
    - Reduce pollutants getting into our streams
  - Educate and engage all stakeholders
    - Individual actions make a difference
  - Focus on watersheds showing greatest impacts

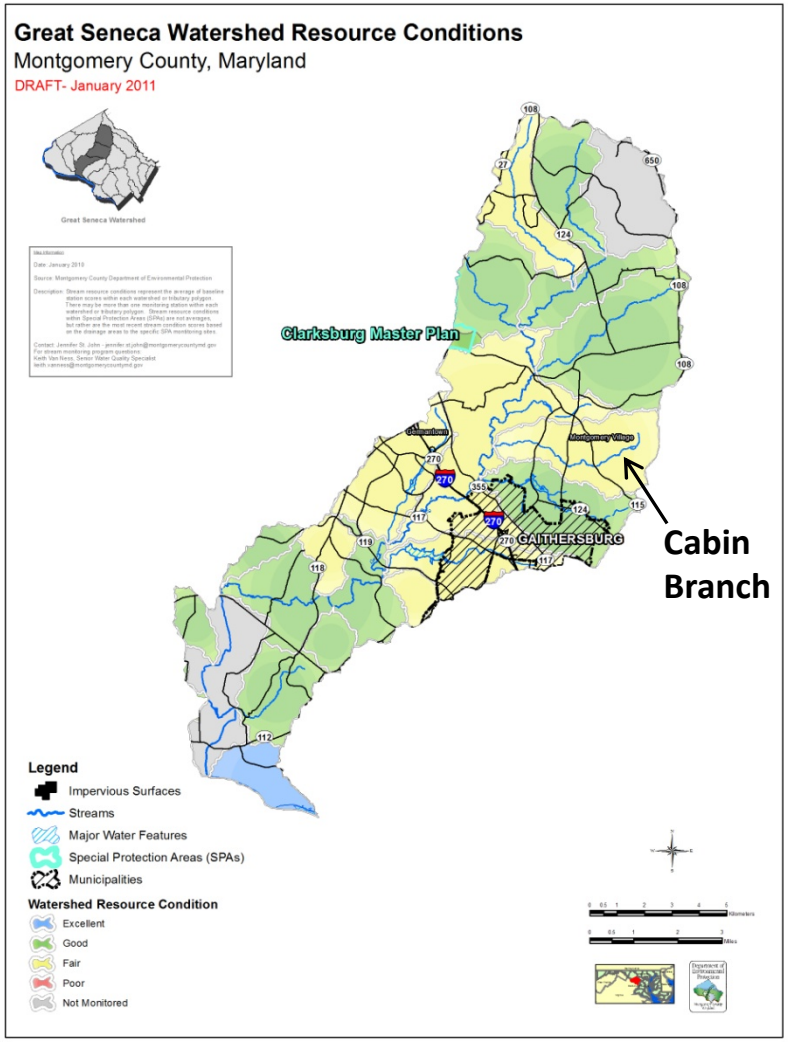
MS4 Permit: What is it?

- Montgomery County is responsible for:
  - What goes into our storm drain pipes
  - What comes out of them
  - What flows into the streams
- Requires additional stormwater management for **20 percent** of untreated impervious surfaces (4,292 acres = 6.7 square miles). That's about three times the size of Takoma Park.

Overall Goals of the Project

- **Provide water quality treatment and downstream channel protection to meet MS4 program requirements.**
- **Improve ecological value of existing stormwater management facilities.**
- **Improve existing landscaping and plant diversity of existing facilities.**
- **Upgrade existing facilities to comply with safety and design standards.**
- **Utilize existing open space to provide stormwater management.**

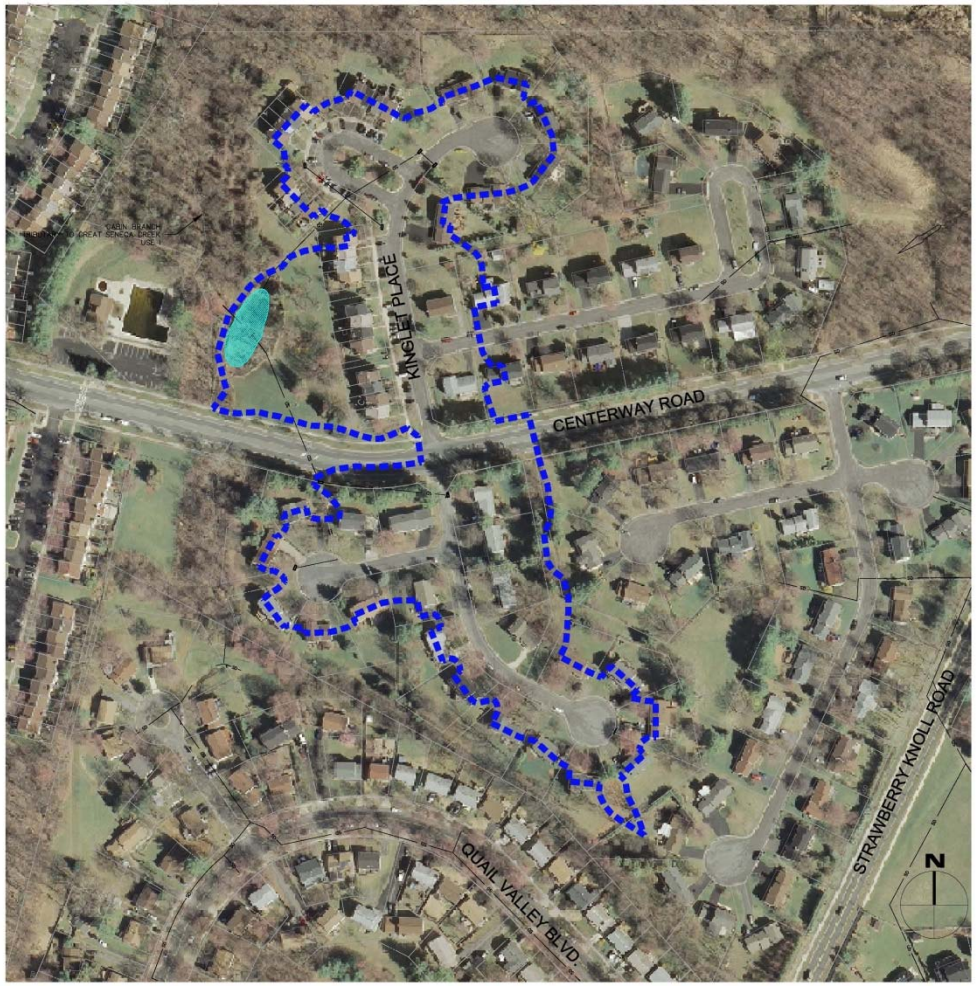
Project Location



Quail Valley Pond # 1
SWM Retrofit
Project Overview

Drainage Area

- 9.24 acre drainage area to pond
- 51% impervious
- Land cover includes roadway, sidewalks, manicured lawns/landscaping.



Existing Conditions

- Constructed in the early 1980s
- Fully developed drainage area
- Does not provide water quality functions
- High groundwater exists in bottom of facility
- Does not meet current safety and design standards (materials and conveyance)
- Sinkholes have recently developed in embankment
- Maintenance access is inadequate
- Minor sediment deposition from upstream erosion

Existing Quail Valley Pond # 1

View of facility from Centerway Rd

Bottom of facility showing base flow

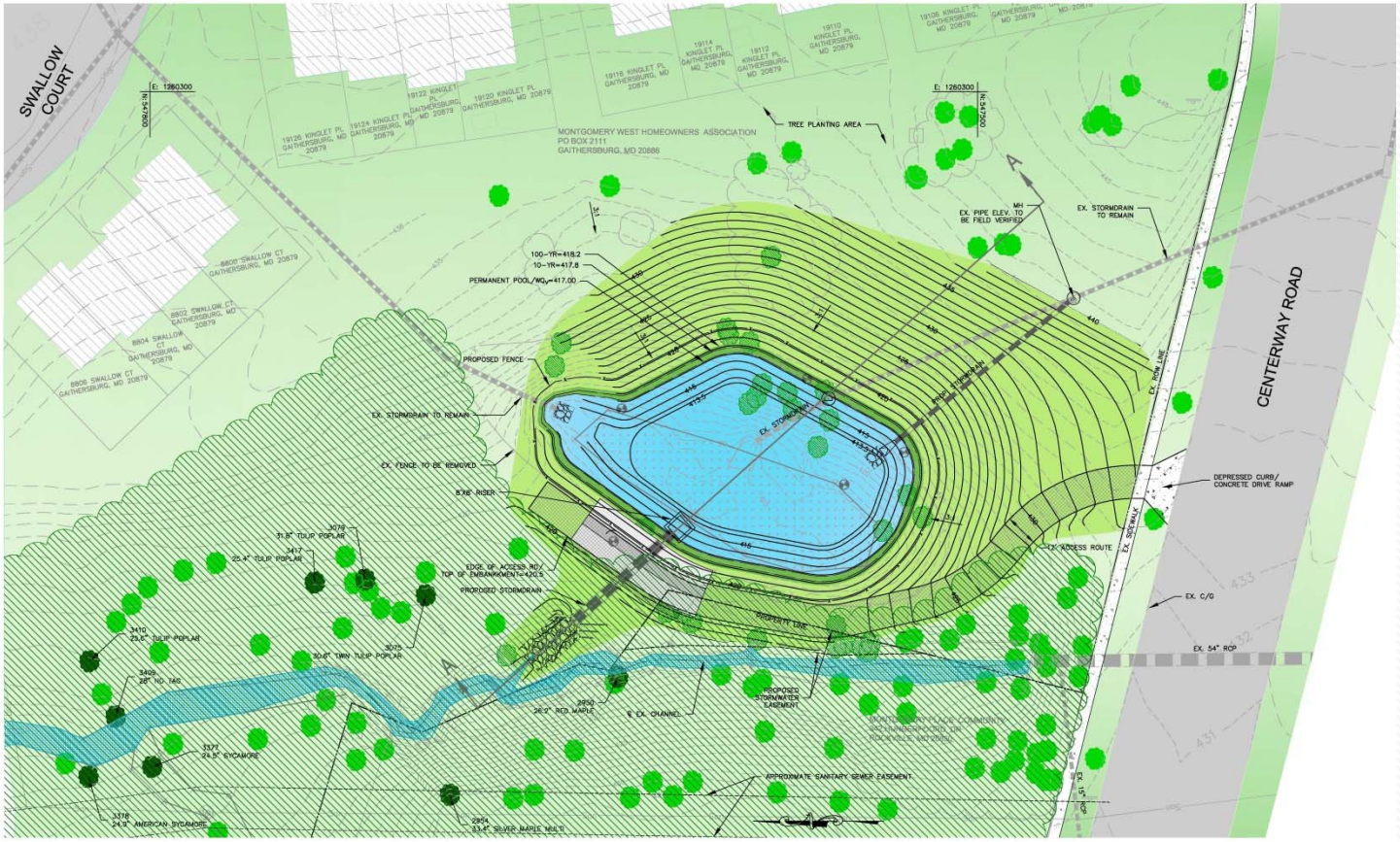
Existing substandard riser.

Sinkhole resulting from riser degradation.

Retrofit Design Details

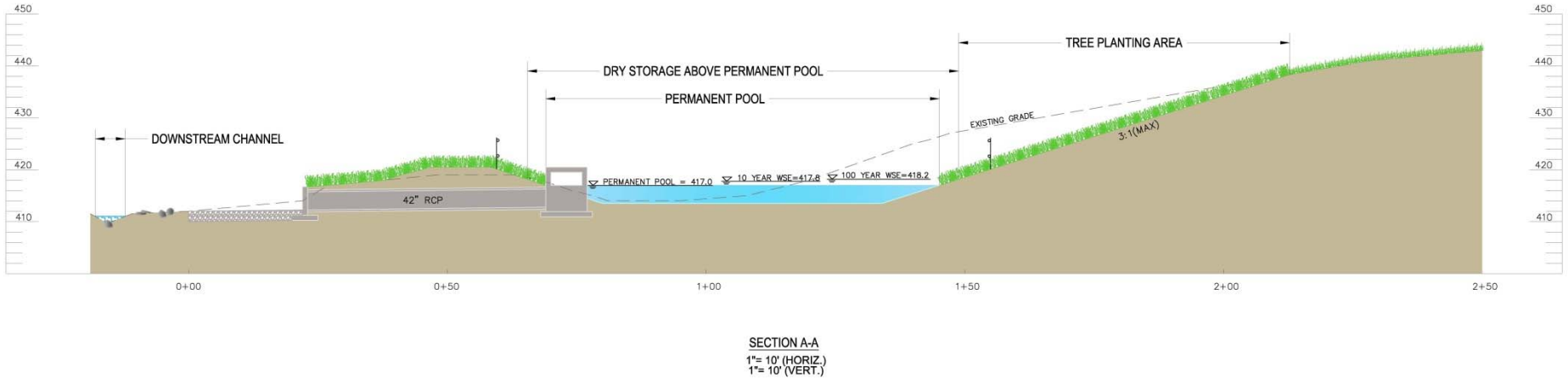
- Grade bottom of pond and eastern bank.
- Create a 3.5’ deep wet pool.
- Remove and replace existing riser and outflow pipe.
- Reconstruct portion of existing embankment.
- Remove small diameter trees within limits of work.
- Provide access path for maintenance.
- Re-vegetate pond and plant additional trees.

Proposed Pond Retrofit



Plan View

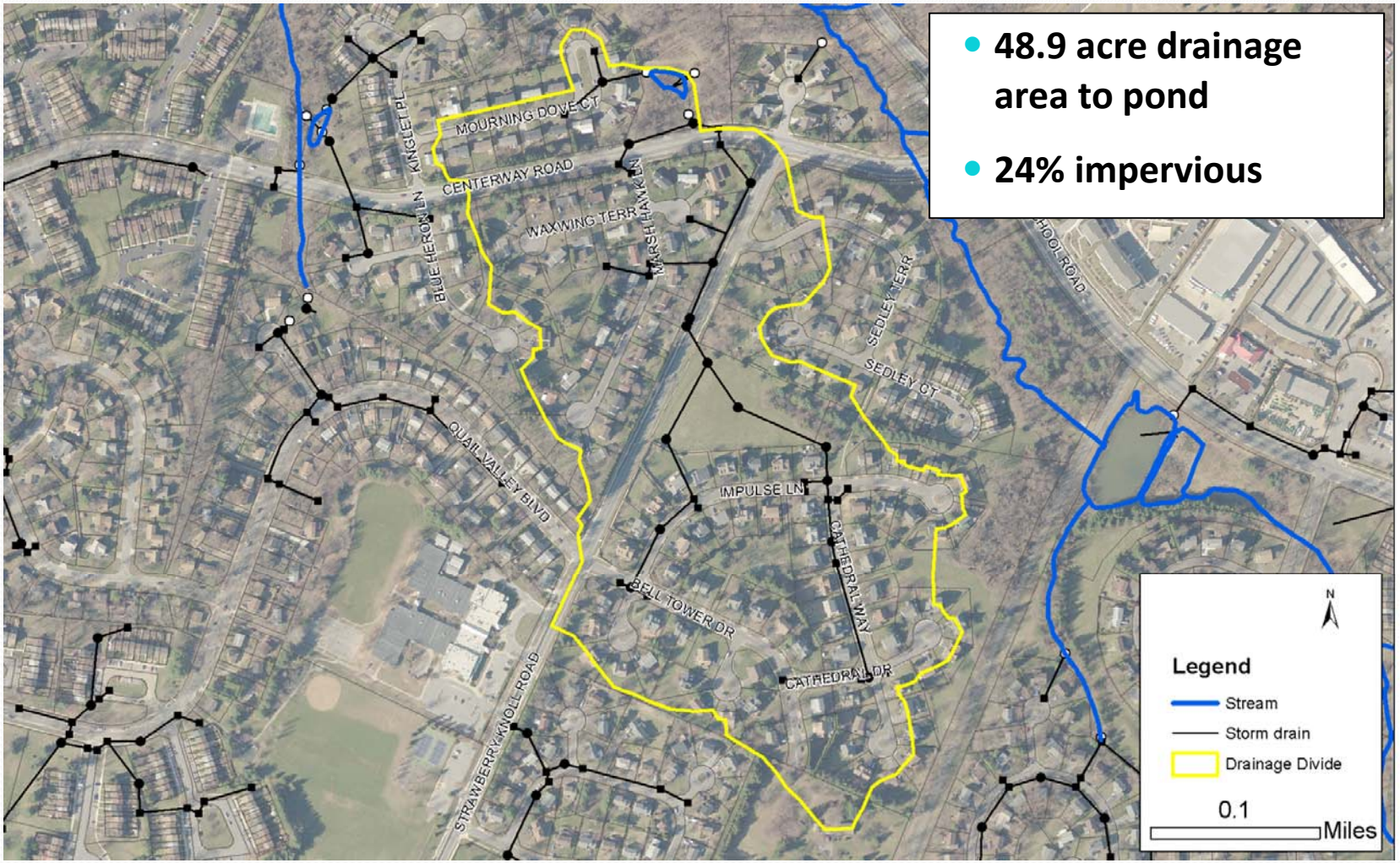
Proposed Pond Retrofit



Profile

Quail Valley Pond # 2
SWM Retrofit
Project Overview

Drainage Area



- 48.9 acre drainage area to pond
- 24% impervious

Existing Conditions

- Constructed in the early 1980s
- Fully developed drainage area
- Dry detention pond constructed in a stream valley
- Very few ecological or water quality benefits
- Good condition, but riser is nearing end of service life
- Maintenance access is inadequate
- Minor sediment deposition from upstream erosion
- Degradation and incision of downstream channel

Existing Quail Valley Pond # 2

Retrofit Design Details

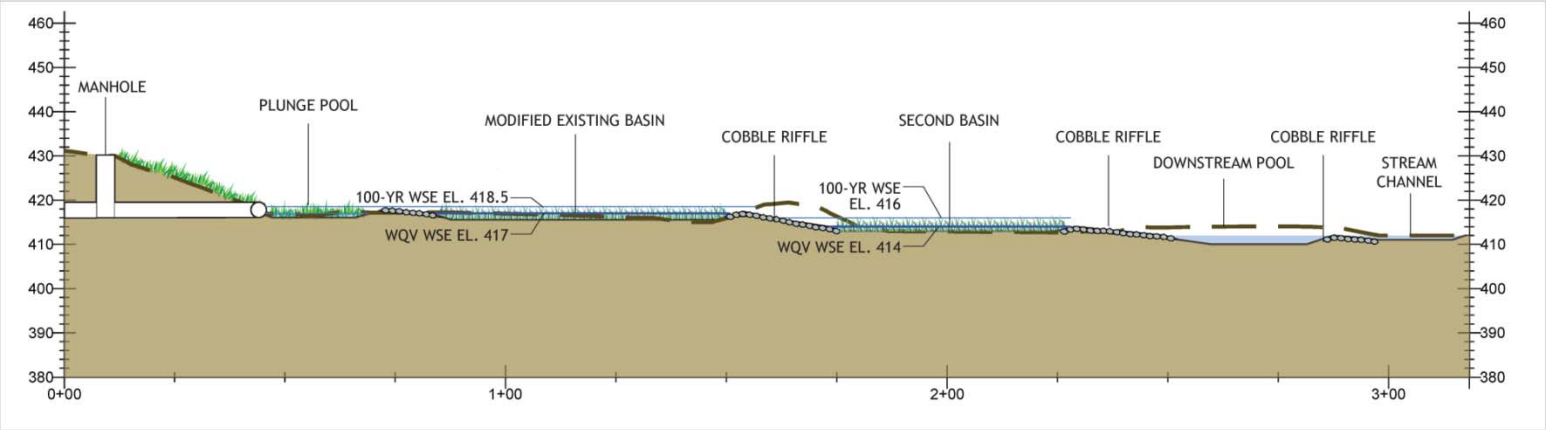
- Enlarge the storage volume to treat 50% of the Water Quality Volume (WQv)
- Add a sand berm to increase infiltration
- Grade an additional storage basin in existing open space adjacent to stream banks
- Safely pass larger storms, including the 100-year storm

Retrofit Design Details

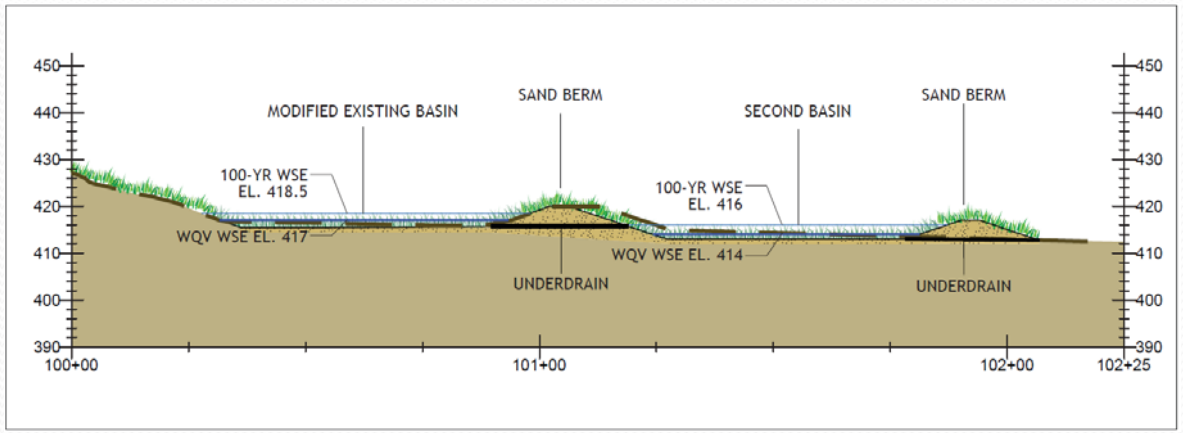
- Install a forebay at the top of the pond to improve maintenance
- Remove existing risers and replace with cobble riffle structures
- Restore downstream channel using step pools
- Revegetate pond with native plants

Proposed Pond Retrofit

Proposed Pond Retrofit



Profile of Proposed Retrofit



Cross-Section of Proposed Retrofit

Stormwater Pond Retrofit During Construction

Stormwater Pond Retrofit Within 1 Year After Construction

Stormwater Pond Retrofit Within 5 Years After Construction

Strawberry Knoll Underground SWM Facility Project Overview

Drainage Area

- 20.5 acre drainage area to facility
- 37% impervious
- Land cover includes roadway, sidewalks, manicured lawns, open space, and landscaping.

Existing Site Conditions

- Parcel is owned by the Flower Hill Central Corporation
- Parcel provides open space for Flower Hill Community
- Two stormdrain systems connect under open space
- Flow in existing stormdrain is not treated for Water Quality or Channel Protection
- Space is available on site to provide an SWM facility
- Site is accessible from Strawberry Knoll Road

Existing Open Space

Location of Proposed SWM Facility.

Open space south of proposed facility.

Location of proposed construction and maintenance access.

Existing inlet which SWM system will connect to.

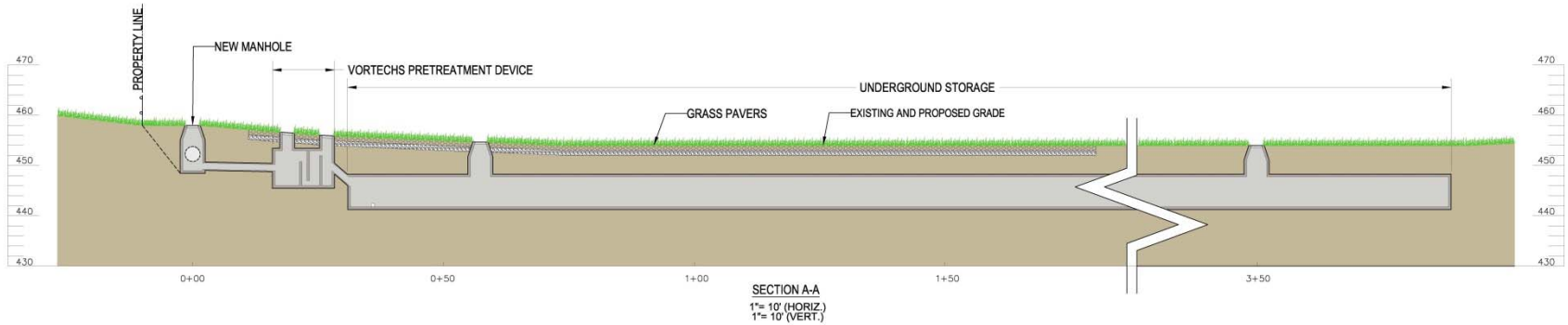
SWM Design Details

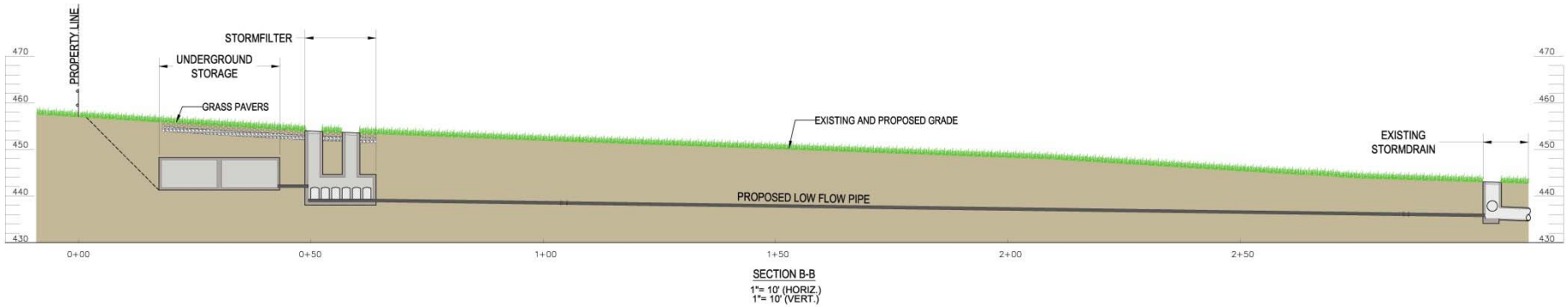
- Underground gravity driven treatment system.
- Three components: pretreatment, storage, and treatment.
  - Pretreatment simplifies and reduces the need for maintenance.
  - Storage System stores stormwater until filtered.
  - Filter replaces natural functions depleted with development.
- Provide stable vegetated access path for future maintenance.

Proposed SWM Design

Plan View

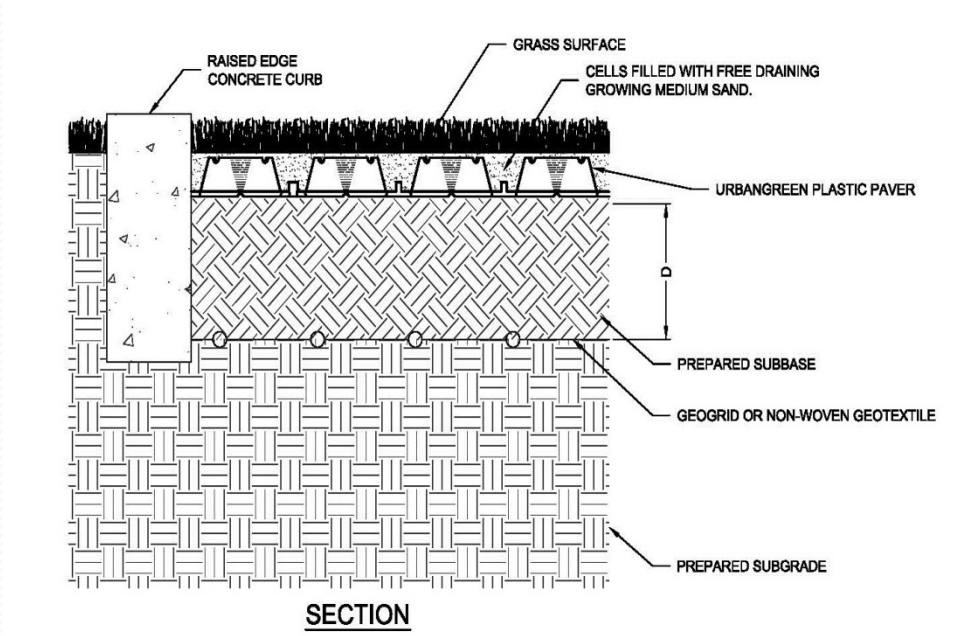
Proposed SWM Design





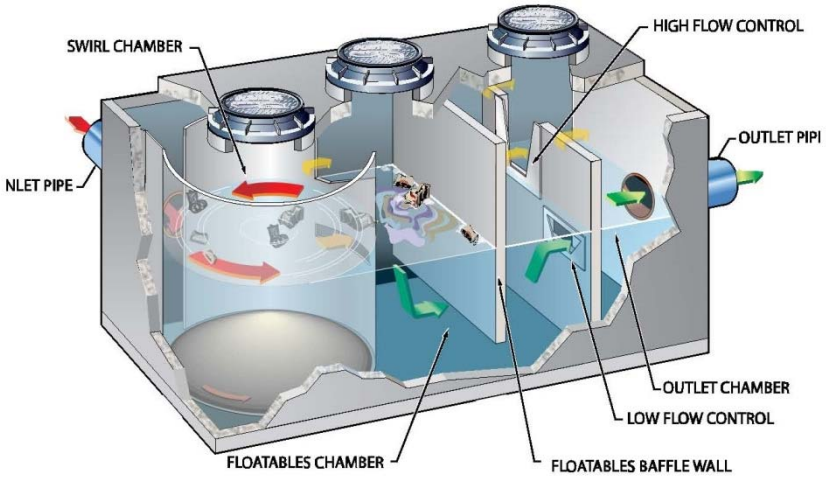
Profile

Grass Pavers



UrbanGreen Grass Paver Detail

Stormwater Treatment

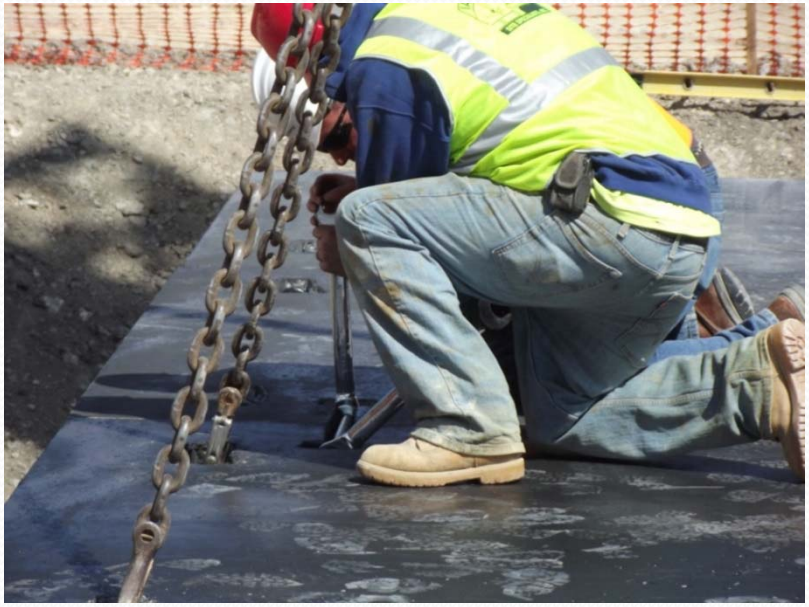


Vortechs Pretreatment System

Stormfilter System

Underground SWM Facility During Construction

Storage system being installed



Watertight joint being sealed

Quail Valley Pond # 1 Construction Access

- Access from Centerway Road
- Tree removal and grading
- Tree protection where needed
- Mulch placed on path and removed after construction
- Access will be stabilized to prevent sediment transport to Centerway Road

Quail Valley Pond # 2 Construction Access

- Access from Centerway Road
- Clear width will likely require tree removal and grading
- Tree protection where needed
- Mulch placed on path and removed after construction

Strawberry Knoll Construction Access

- Access from Strawberry Knoll Road
- Access will be stabilized to prevent sediment transport to Strawberry Knoll Road
- Curb ramp and grass pavers will be provided at final stages of construction.

Location of proposed construction and maintenance access.

Construction Access (Example)

During Construction

After Construction

Reforestation

- **Attractive native trees and shrubs will be planted within the project area**

Schedule

- Public meeting to discuss 30% designs 2/11/2014
- 60% design – Summer 2014
- 90% design – Winter 2014
- Permits issued – Spring 2015
- Construction – Summer 2015

Questions/Comments?

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www.montgomerycountymd.gov/watershedrestoration
Click on "Stream Restoration" and "Stormwater Pond Retrofits"