



**TOTAL RECONSTRUCTION
MILEPOST 320 TO 326**



STORMWATER MANAGEMENT

Design Roundtable Meeting – February 26, 2009



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❑ OBJECTIVES

- Briefly review the purpose and components of Stormwater Management.
- Summarize the two alternatives designed prior to the version displayed at the Open House Plans Display on 1/27/09.
- Highlight the improvements made which resulted in the scheme presented on 1/27/09 at the Open House.
- Discuss work being done as a result of the Open House.



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□ Definition

Management of stormwater runoff to **control** the release of water into nearby streams and waterways. Its purpose is to maintain or improve characteristics of the existing streams and to protect the safety of the public by reducing flood events.

“**Control**” is measured four ways:

- **Volume** (will be the critical component)
- **Rate**
- **Quality**
- **Thermal**



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- Volume Control Regulations and Recommendations
 - Can not increase the Volume of water discharged from a project site and can not degrade the quality of the receiving waters.
 - Safety factors applied
 - PADEP: assume 20% of existing paved area is grass (meadow condition)
 - Tredyffrin: assume ALL of existing paved area is grass.

 - Volume Control Challenges
 - Poor soils
 - Geology (Dolomite bedrock) – Sinkhole prone
 - Large basin footprints to meet loading ratio



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□ Volume Control Methods

- Infiltration or groundwater recharge (preferred)

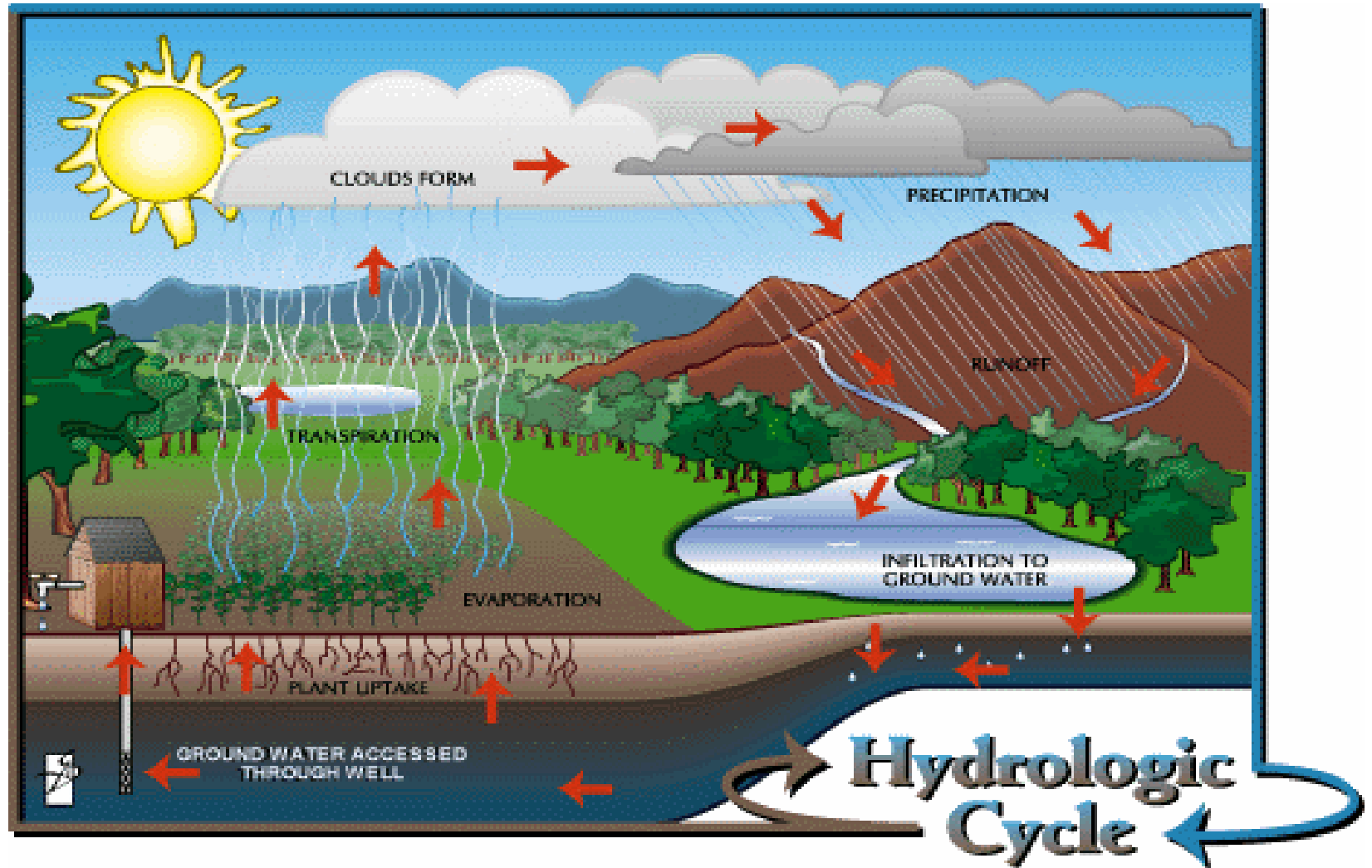
Retain water in ponds or other facilities to allow water to infiltrate into the ground. Good Soils are required. Infiltration must be spread out over a large area (Loading Ratio).

- Capture and reuse

Retain water in storage tanks and reuse for other purpose

- Evapotranspiration

Water evaporating from the ground and transpiration by heavy vegetation or constructed wetlands. Generally, a smaller volume of water can be handled by this method.





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Progression of the Design



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□ Design Challenges

- Poor soils
- Geology (Dolomite bedrock) – Sinkhole prone
- Large basin footprints to meet loading ratio
- Heavy residential, commercial and historic properties
- Specific outlet locations from stormwater facilities
- Designated 100 year flood plain



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□ August 2007

- Alternative 1: Handled Rate and Quality control along with a minimal amount of Volume control (infiltrate 2.2 acre-feet of runoff). Right of Way needs were limited.

□ May 2008

- Alternative 2: Handled Rate and Quality control plus an additional amount of Volume control (infiltrate 7.2 acre-feet of runoff). Right of Way impacts were substantial.



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- **January 2009** – Design presented at the Open House
 - Scaled down sizes of most basins to lessen right-of-way and residential impacts.
 - Evapotranspiration incorporated in many basins to enhance volume reduction where infiltration is not feasible.
 - Subsurface testing is in progress to determine if infiltration is appropriate in the basins as currently planned.
 - Working actively with PADEP and Tredyffrin Township to solicit their suggestions and requirements.
 - Will be pursuing off site stormwater mitigation opportunities to further increase volume reduction in the Trout Run and Valley Creek watersheds.
(infiltrate 5.9 acre-feet of runoff)



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- **Additional work since Open House Plans Display**
 - Collecting feedback from participants of the Open House.
 - Beginning to evaluate revisions to the stormwater design.
 - Further correspondence with Valley Forge National Historical Park, PADEP and Army Corps of Engineers.



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**Overview of Current Design
and Discussion**



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□ Basin 1A

- Located on Trammell Crow property to avoid residential/commercial impacts north of Yellow Springs Road.
- Two basins serve this watershed.
- Basin 1A-2 may take additional coordination to satisfy Trammell Crow and the Cedar Hollow Inn for their parking needs.
- Basin should infiltrate (good soils, good geology.)



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□ Basin 1B

- Located on Beers property.
- Adjacent properties were investigated. Elevation of selected property was most favorable.
- Outlet point, south of Yellow Springs Road, is accessible.
- Basin should infiltrate (good geology, assumed good soils)



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□ Basin 2A

- Located on Menning property.
- All water from this watershed flows to Wetland G on this property, which is the low point of the drainage area.
- Adjacent properties were investigated. Historically eligible property and lack of discharge point were unfavorable.
- Outlet point, south of Yellow Springs Road, is accessible.
- Infiltration allowed but limited (good geology, soil permeability limited based on nearby testing.)



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□ Basin 2B

- Located on Fenninger property.
- This property is the lowest elevation in this watershed and is nearest the natural outlet point of the drainage area.
- Adjacent properties were investigated. Lot size and elevation were unfavorable.
- Infiltration allowed but not expected (good geology, soil permeability limited based on nearby testing.)



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□ Basin 3

- Located on Cox and acquired Turnpike property.
- This area is targeted as a turnaround access for maintenance vehicles.
- Acquired property was helpful but not large enough to avoid additional impact.
- Outlet point, south of Yellow Springs Road, is accessible.
- Infiltration allowed but not expected (good geology, soil permeability limited based on nearby testing.)



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□ Basin 4

- Located on Turnpike Surplus property.
- Maximizing capacity and utilization of this property and basin.
- Originally designed for infiltration (good soils, questionable geology). Recent geophysical testing indicates increased risk of sinkholes. Infiltration not recommended. Basin to be lined and designed for evapotranspiration.



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□ Basin 5

- Located on Mill Valley Open Space property.
- Avoidance of residential impacts.
- Considering noise wall and trail configurations
- Infiltration not allowed (sinkhole prone geology). Recent geophysical testing confirmed. Basin to be lined and designed for evapotranspiration.



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□ Basin 6

- Located on Reilly property.
- Avoidance of residential displacement (no residence on this property).
- Adjacent properties, including Turnpike property to the south, were considered. Lot size and proximity to outlet point were unfavorable.
- Infiltration allowed but not expected (good geology, soil permeability limited based on nearby testing.) Further testing required.



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□ Basin 7

- Located on Chesterbrook Open Space property.
- Avoidance of residential impacts.
- Easy maintenance access from Stockton Drive cul-de-sac.
- Infiltration not allowed (severe sinkhole prone geology). Recent geophysical testing confirmed a potentially severe condition. This basin may have to be relocated. At a minimum, the basin must be lined and designed for evapotranspiration. Further testing required.



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□ Basin 8

- Modification of existing basin on Greater Valley Stream Village Homeowners property and a remote piece of Holmwood/Fetterman property
- Adjacent properties contain 100 year flood plain of Valley Creek and heavy residential area which are unfavorable.
- Originally designed for infiltration (assumed good soils, questionable geology). Recent geophysical testing indicates increased risk of sinkholes. Unsure of ability to infiltrate. Further testing required.



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□ Basin 9

- Located on Sullivan's Bridge Open Space and Tredyffrin Township Municipal authority property.
- Underground utilities make this a very challenging area, but more favorable than 100 year floodplain or heavy residential area.
- Infiltration not allowed (sinkhole prone geology). Recent geophysical testing confirmed. Basin to be lined and designed for evapotranspiration.



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□ Basin 10

- Located on Davis and Ledwith property.
- Alternate designs are being investigated:
 - Have met with VFNHP recently – stormwater storage not permitted use of Park land.
 - Beginning coordination with ACOE and PADEP to use Green Hills Landowners property in combination with relocating stream channel.
- Soils and Geologic testing has not yet been conducted for any of these potential alternatives.



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□ Basin 11

- Located on Turnpike Surplus property.
- Maximizing capacity and utilization of this property and basin.
- Infiltration not allowed (sinkhole prone geology and proximity to Aqua well head protection area). Recent geophysical testing confirmed. Basin to be lined and designed for evapotranspiration.



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□ Basin 12

- Located on Turnpike Service Plaza property.
- Maximizing capacity and utilization of this property and basin to improve runoff from Turnpike to Richards Road and Trout Run area.
- Infiltration not allowed (severe sinkhole prone geology) based on recent geophysical testing. Basin to be lined and designed for evapotranspiration.



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□ Basin 14

- Located on Durkin property.
- Adjacent properties were investigated. 100 year floodplain covers most of nearby area creating unfavorable alternative.
- Infiltration not allowed (sinkhole prone geology). Basin to be lined and designed for evapotranspiration.



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□ Basin 15

- Located on Glenhardie Golf Course and Turnpike Surplus property.
- Maximizing Turnpike property and avoidance of residential impacts.
- Coordination with Golf Course to integrate basin into landscape of the course.
- Infiltration not allowed (sinkhole prone geology, high water table). Basin to be lined and designed for evapotranspiration.



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Remaining Agenda Items:

- Design Roundtable Issues
- Future Meeting Dates
- Conclusion



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