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LESSONS LEARNED IN INNOVATIVE STORMWATER BMP DESIGNS

SIMPLE AND EFFECTIVE TECHNOLOGY APPLICATIONS

May 18, 2017

Trends in MS4 Compliance

- Integration of TMDL requirements in MS4 permits
- Current financial resources may not be enough to achieve compliance – need innovative approaches
  - Integrated planning and master planning
  - Longer compliance timeframes with reasonable goals
  - Opportunities to prioritize actions and obtain alternative funding sources
  - Innovative BMPs
- Monitoring requirements are evolving
- Align permit compliance with your community plans

Your needs should drive the permit requirements

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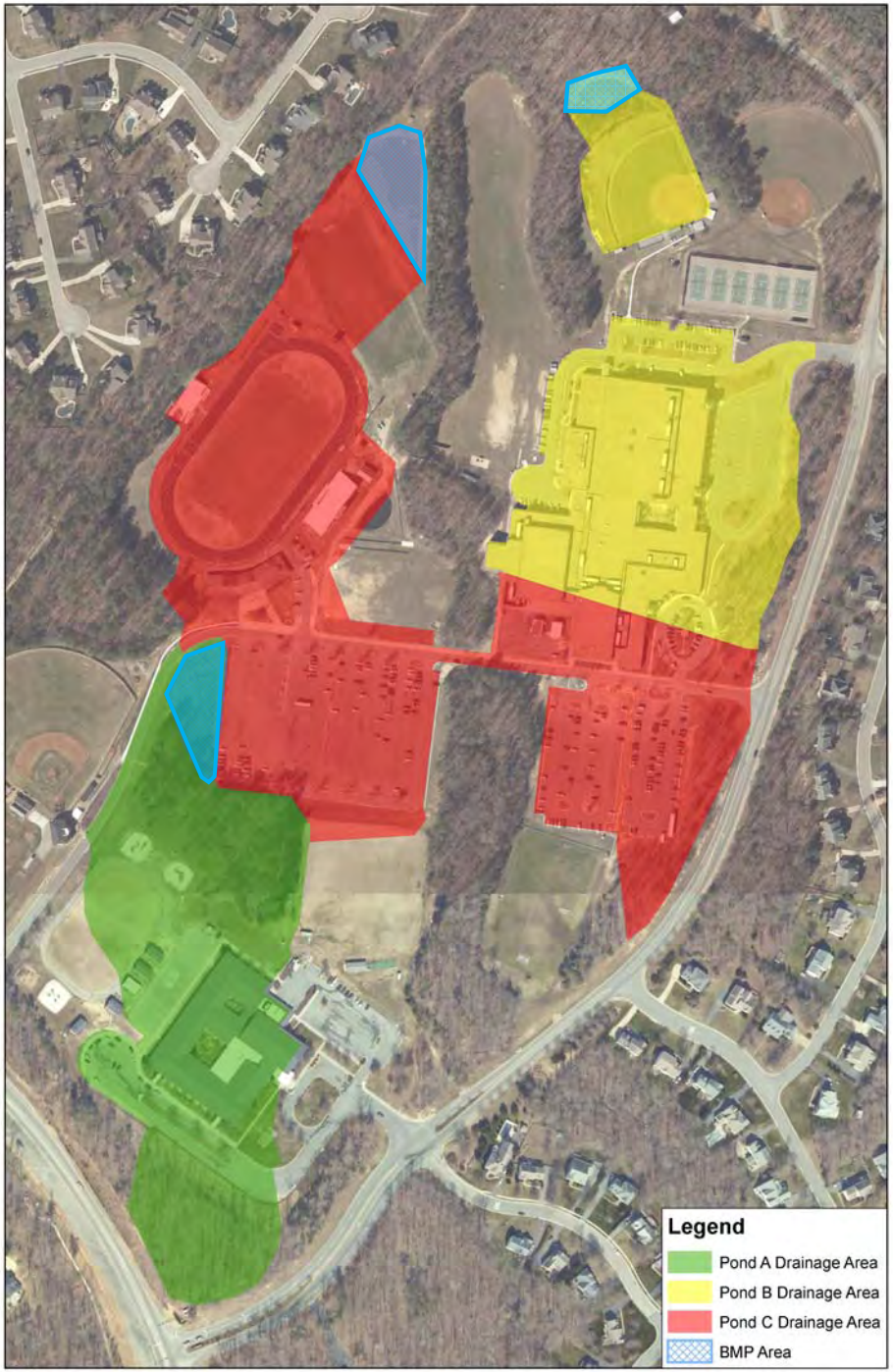
The Opportunity: Go beyond compliance from projects to an integrated program

Pond Retrofits
James River High School

- Retrofit of 3 dry extended detention ponds to:
  - Constructed Wetlands
  - Wet Pond Level II
  - Wet Pond



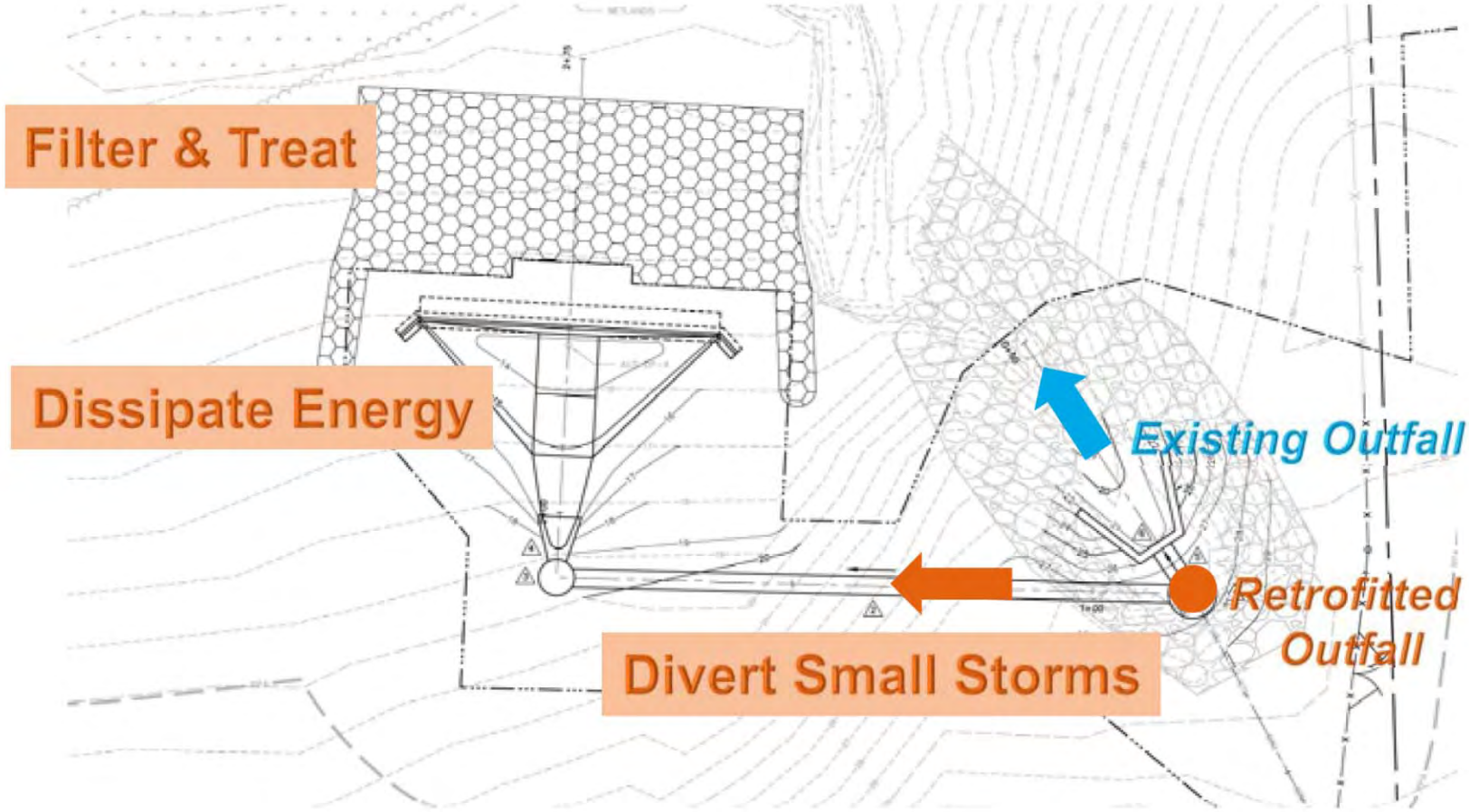
Pond Retrofits
James River High School

- Sedimentation over 20 years led to loss of functionality
- Enhancements to maximize pollutant reductions (TMDL credits):
  - Increasing volume
  - Removing paths of short circuiting
  - Adding forebay
  - Adding micropool
  - Wetland plantings

Outfall Retrofits
Proctors Creek WWTP

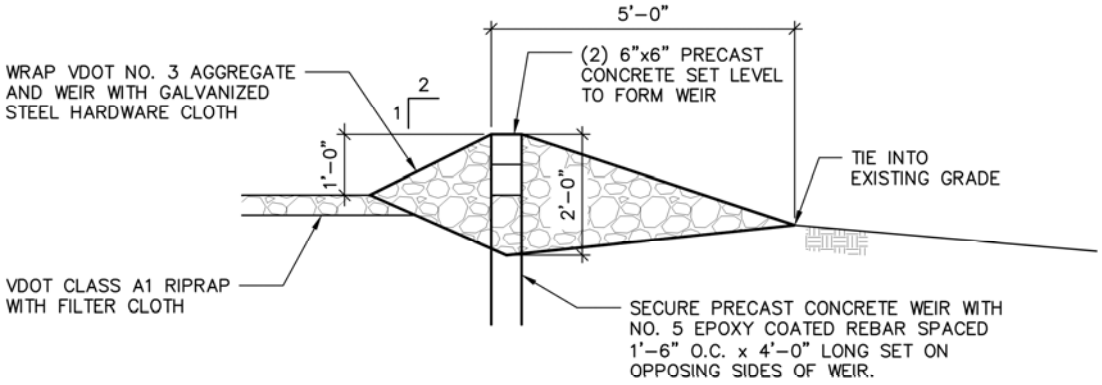
- Retrofit of 2 large diameter outfalls (30” and 42”)

Outfall Retrofits
Sheet flow to “Conserved Open Space”



Outfall Retrofits
Sheet flow to “Conserved Open Space”

- Highly cost effective
- Small footprint
- Sites with no existing treatment



SPREADER WEIR DETAIL

Outfall Retrofits
Proctors Creek WWTP

- Completed 30” Outfall Retrofit

Outfall Retrofits

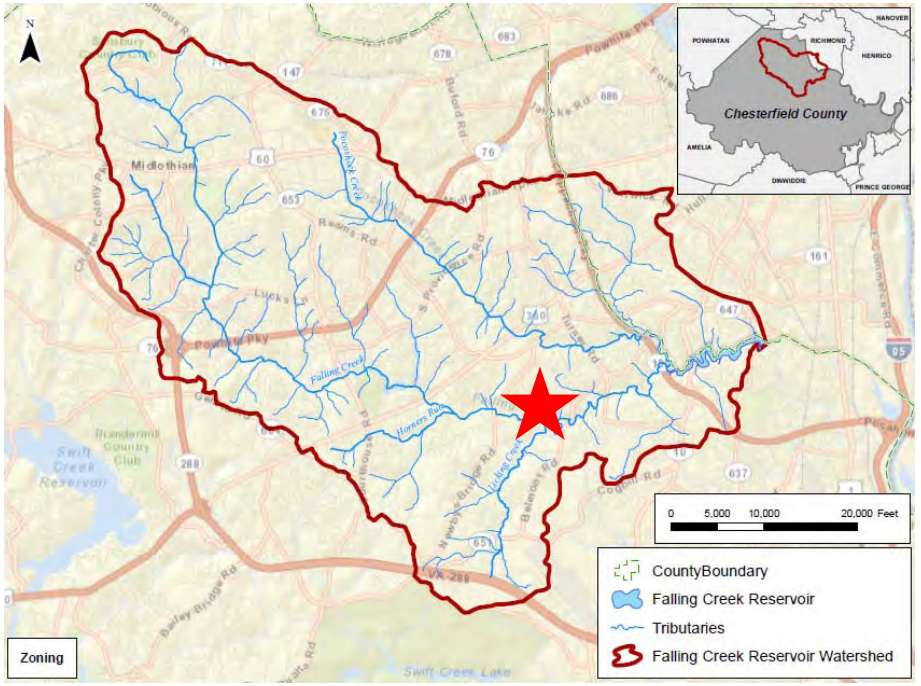
Time-Lapse Video Demonstration

Outfall Retrofits

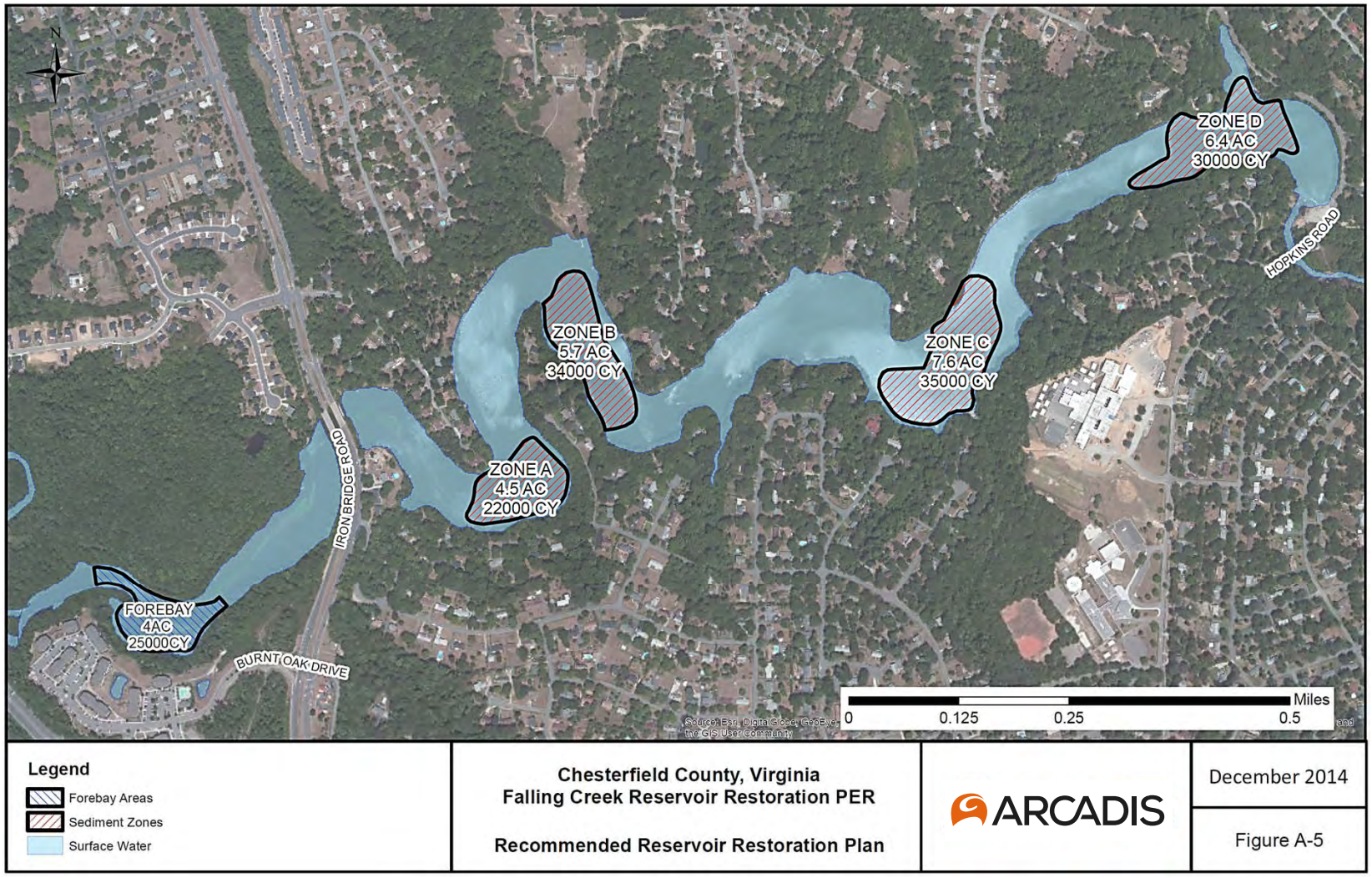
Time-Lapse Video Demonstration

Reservoir Restoration
Falling Creek Reservoir

- 34,000 acre watershed
- Highly developed
- Constructed in 1951 for water supply, but has not been used since 1985



Reservoir Restoration
Falling Creek Reservoir



Reservoir Restoration
Falling Creek Reservoir

Restoration Criterion	Vol. (MG)	Description
Existing Volume at Full Pool	236	Estimated that about 84MG (or 28%) of the original storage volume has been lost due to sedimentation
Sediment Cleanout Volume Criteria *(Remove minimum 10% of existing volume)*	24	Dredging volume of at least 24MG (volume augmentation of 10%) to classify project as a BMP Restoration
Level 1 BMP Treatment Volume Criteria	246	Restore reservoir volume to 246 MG and construct a sediment forebay in Upper Reservoir per BMP design specifications

Restoration Benefits

- Phosphorus Load Reduction of approximately 1,700 lbs/yr
- Potentially up to 40% of the County's required MS4 nutrient reductions met in a single project

Costs for Innovative BMPs

BMP Retrofit	Construction Costs ($)	Pollutant Removal (lbs-P)	Cost Metric ($ / lb. P)
3 Dry Ponds to Constructed Wetlands, Wet Pond (II), & Wet Pond	$600k	25	$23,000
Outfall Retrofit – SGI (2 large diameter outfalls)	$250k	19	$13,000
Reservoir Restoration[1]	$20M	1,700	$12,000

[1] Planning Level Estimate

Innovative BMPs can provide cost effective options to meet your MS4 pollutant reduction goals

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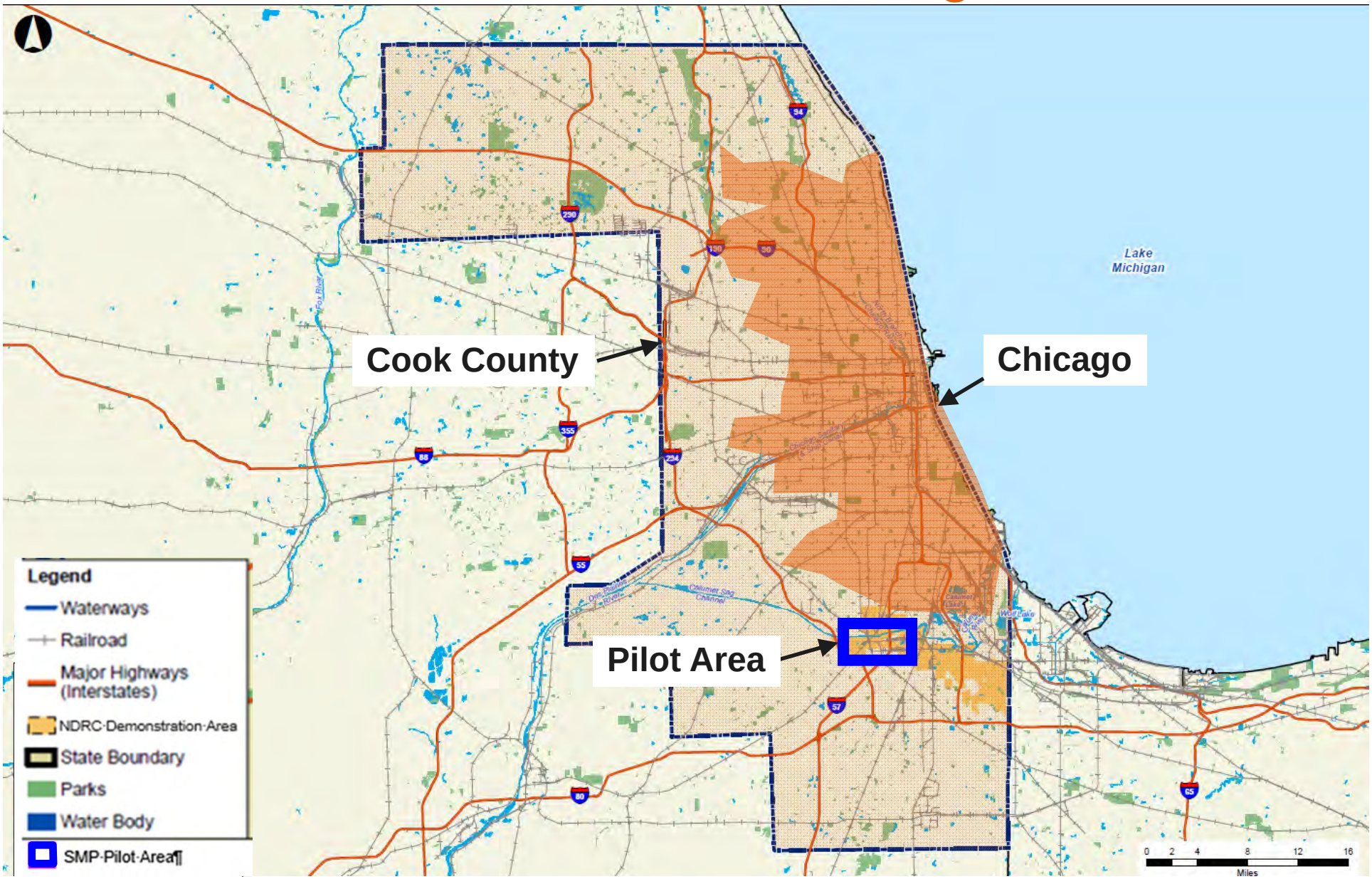
Green Infrastructure Master Planning



Example of Residential Flood Mitigation/Enhancement

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Example of Residential Flood Mitigation/Enhancement

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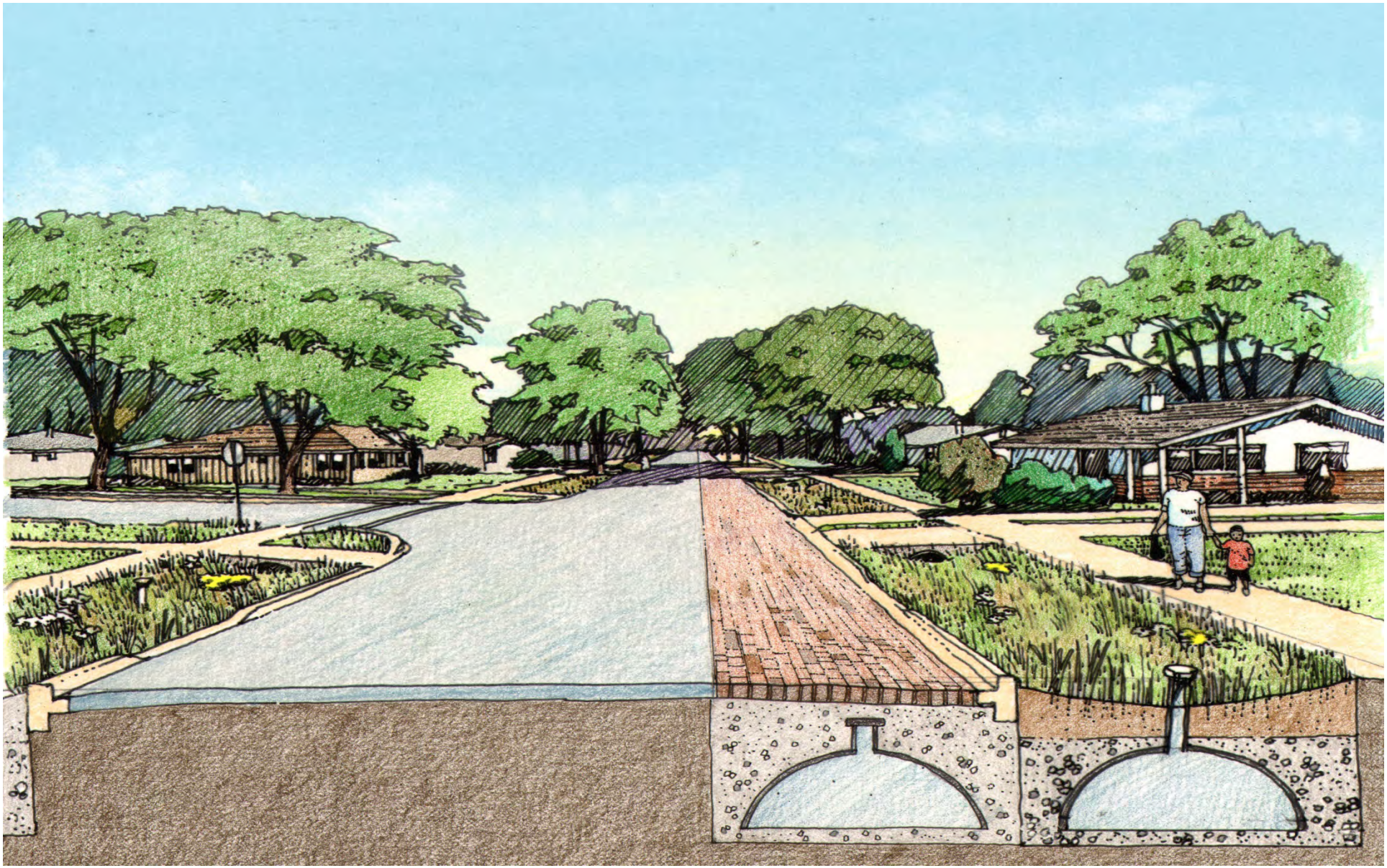

Example of Commercial Flood Mitigation/Enhancement

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Example of Commercial Flood Mitigation/Enhancement

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Lessons Learned

- Innovative BMPs expand toolkit of options to meet requirements
- Costs can be minimized by choosing unique sites for retrofits
- Careful construction is important to ensure best performance of BMPs
- BMPs designed and constructed to meet TMDL requirements can also address flooding
- Master planning can achieve compliance and add value to community

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Improving quality of life.

Thank you!

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