Applications for Regenerative Design on Ephemeral through Perennial Urban Streams:

Design and Environmental Benefit

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2010 ESA Annua
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22-ft incised


12 17:00


No storage on the landscape, all conveyance

Regenerative Stream Channel Design

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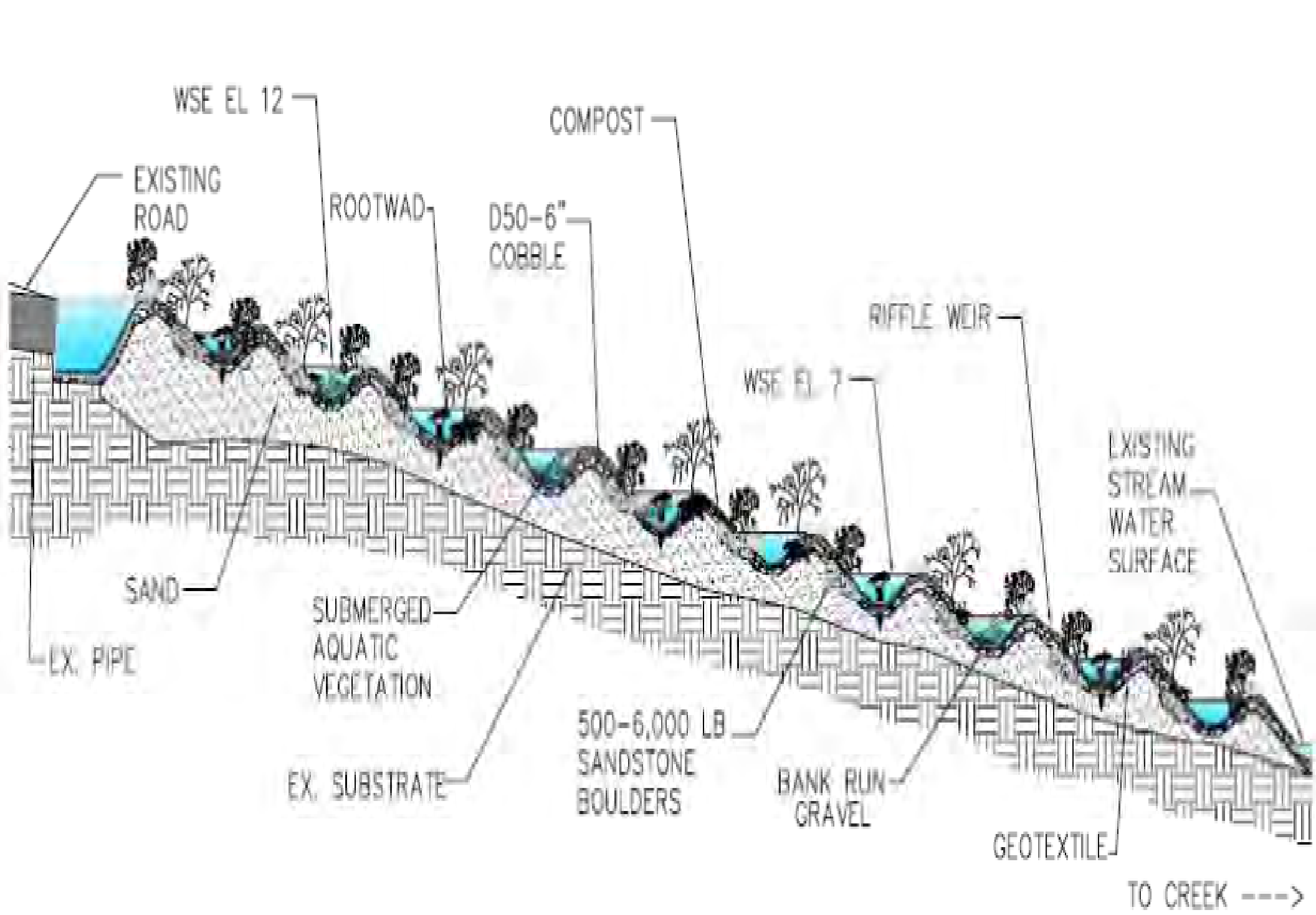
Make Opportunities for Storage

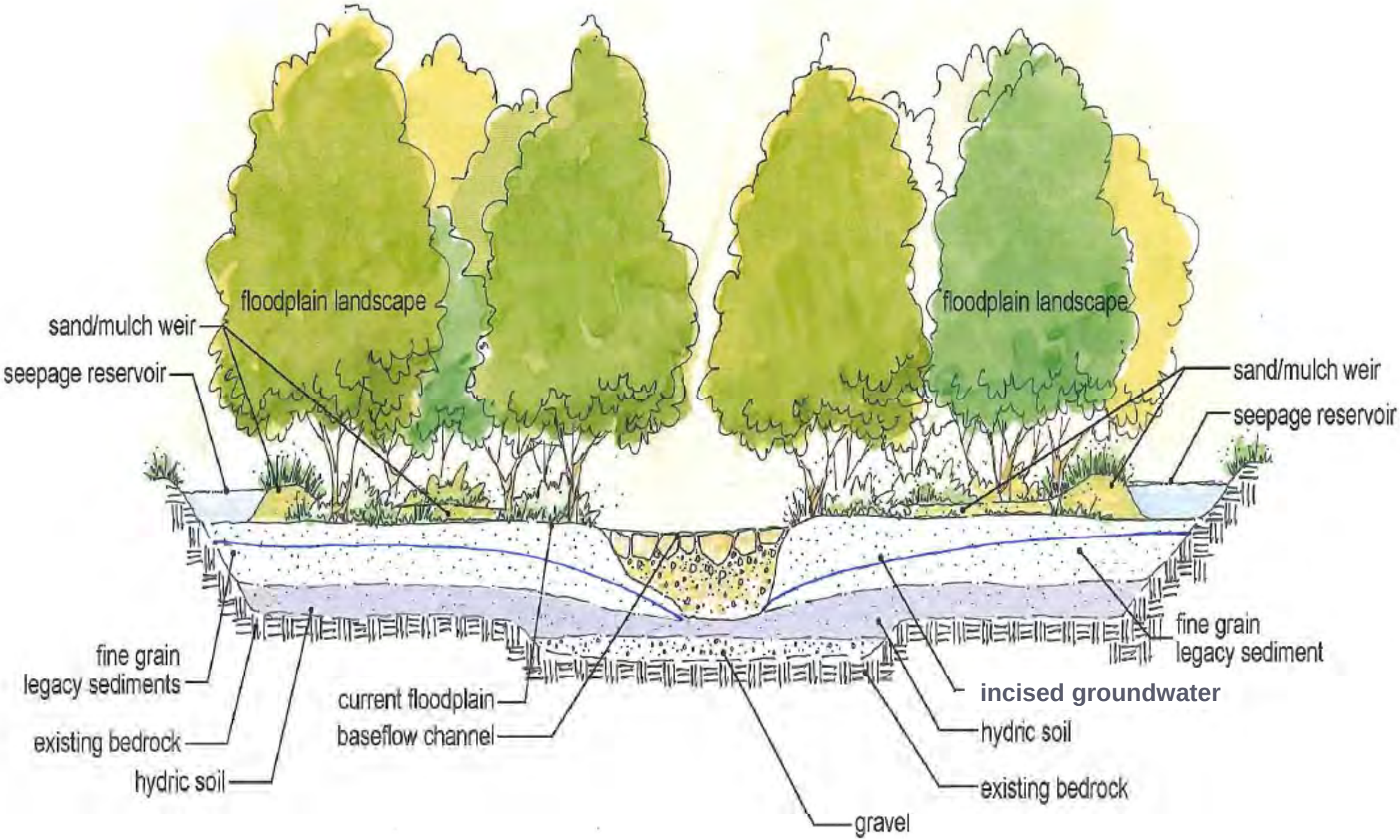
Integrated Stream and Wetland


Set riffles to retain water on landscape

These systems are designed to mimic beaver dams


WSE EL 12
COMPOST
EXISTING ROAD
ROOTWAD
D50-6" COBBLE
RIFFLE WEIR
WSE EL 7
EXISTING STREAM WATER SURFACE
SAND
SUBMERGED AQUATIC VEGETATION
EX. PIPE
500-6,000 LB SANDSTONE BOULDERS
EX. SUBSTRATE
BANK RUN GRAVEL
GEOTEXTILE
TO CREEK --->

Groundwater Restoration



Reconnect Stream

Raising groundwater elevation to near top of bank would store

8.5 ac-ft of water

Estimated to extend baseflow by 19 days

Significant benefits to

Stream hydrograph, shear s, instream-habitat, adjacent wetland hydrology, etc.

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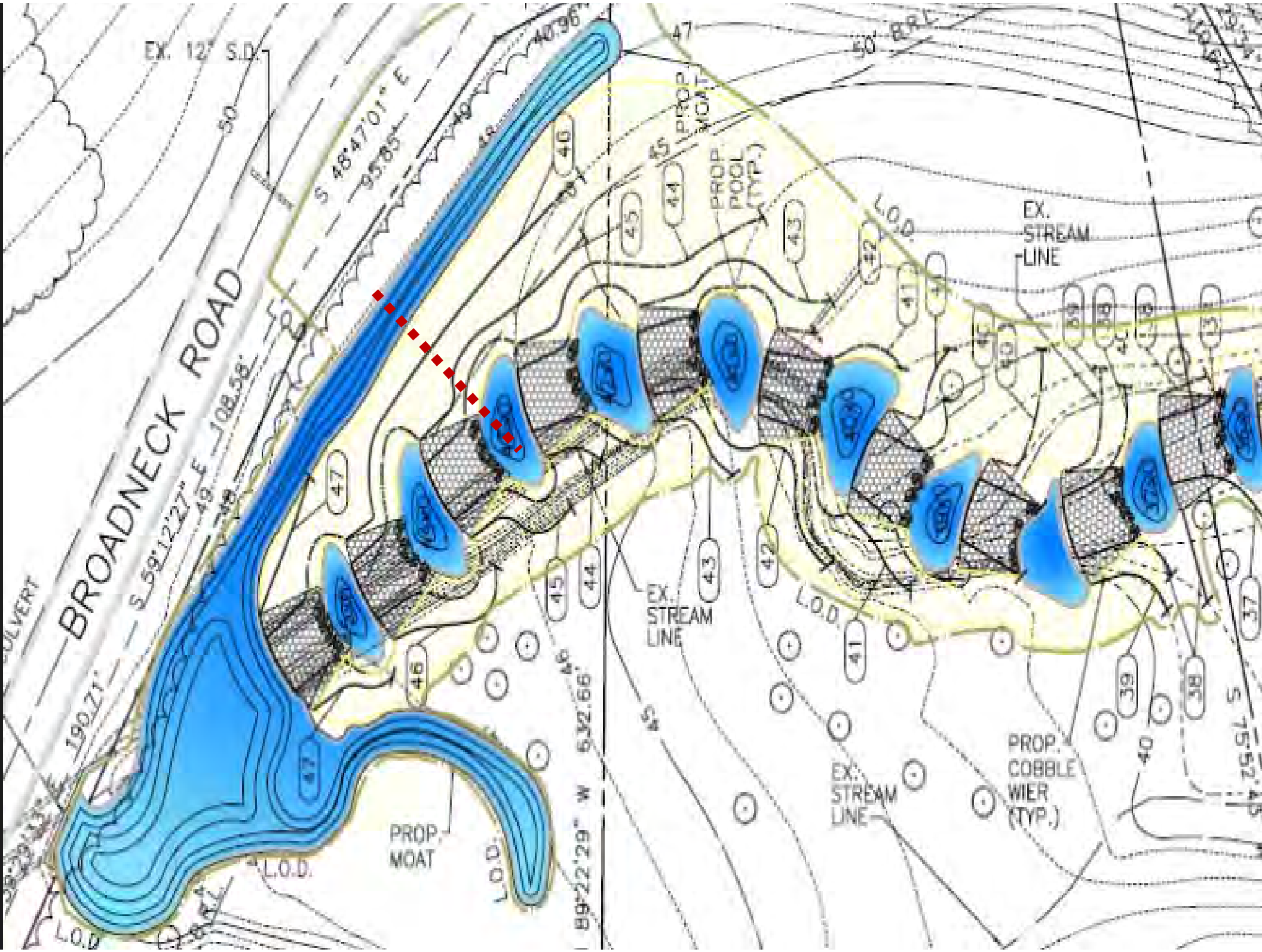
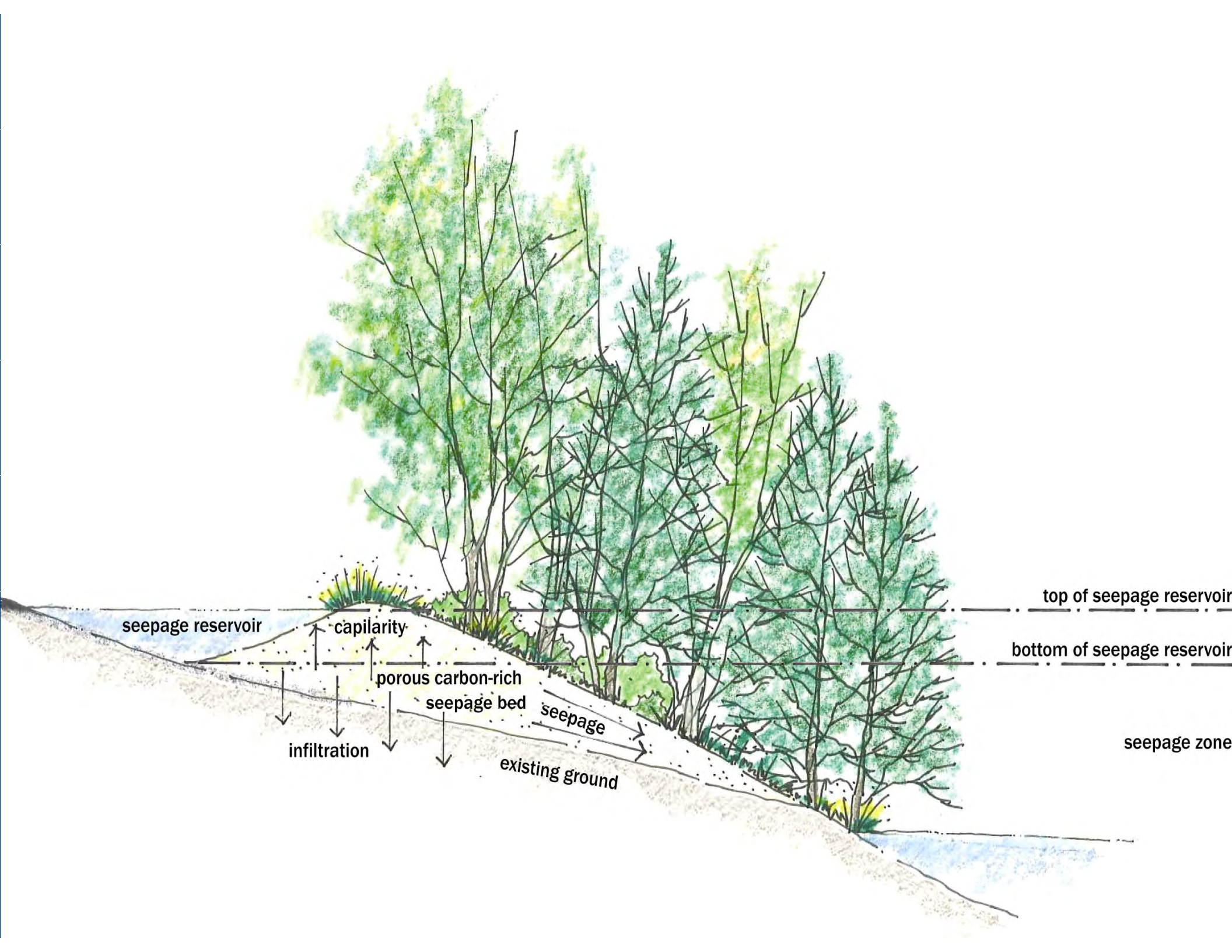
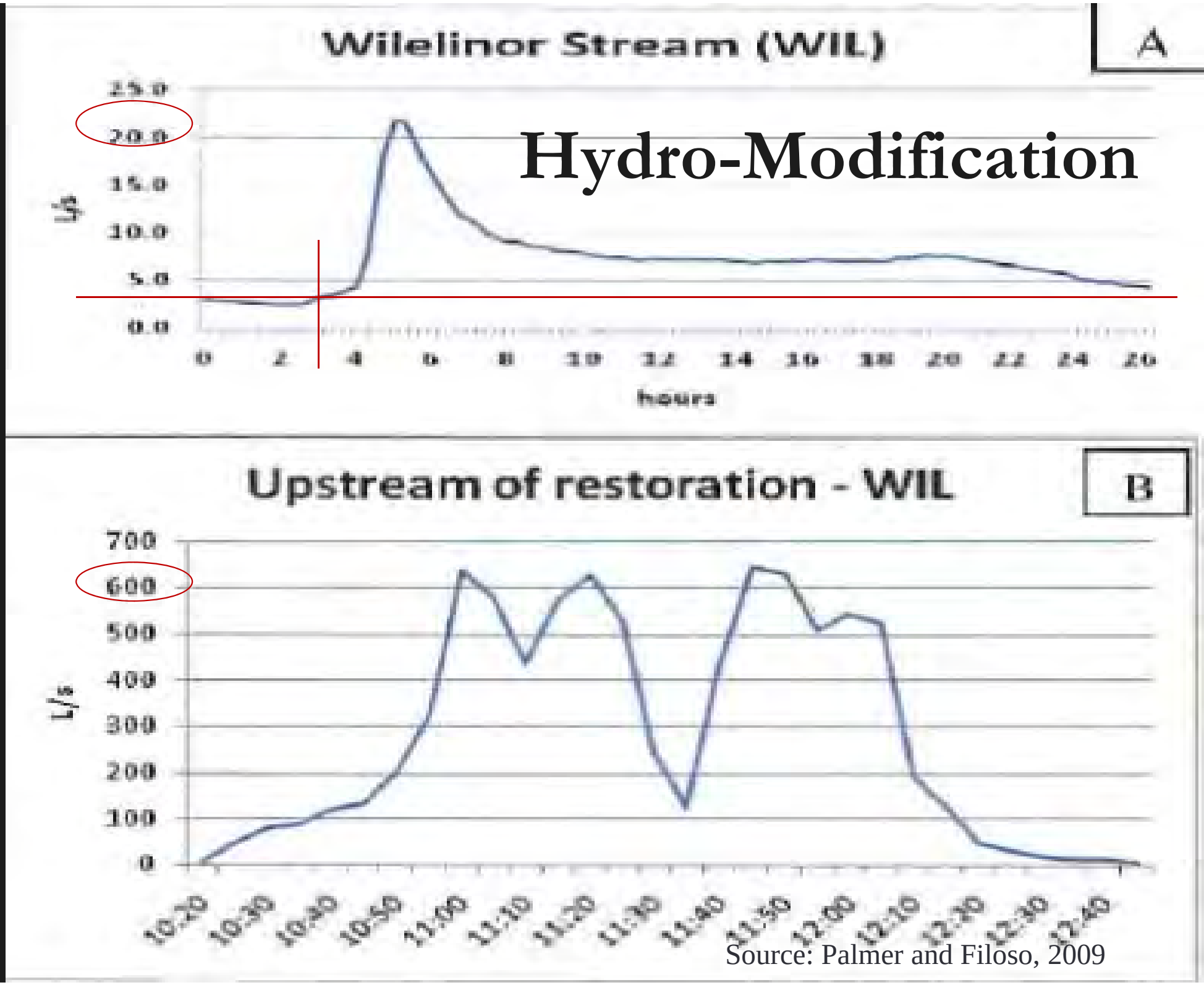
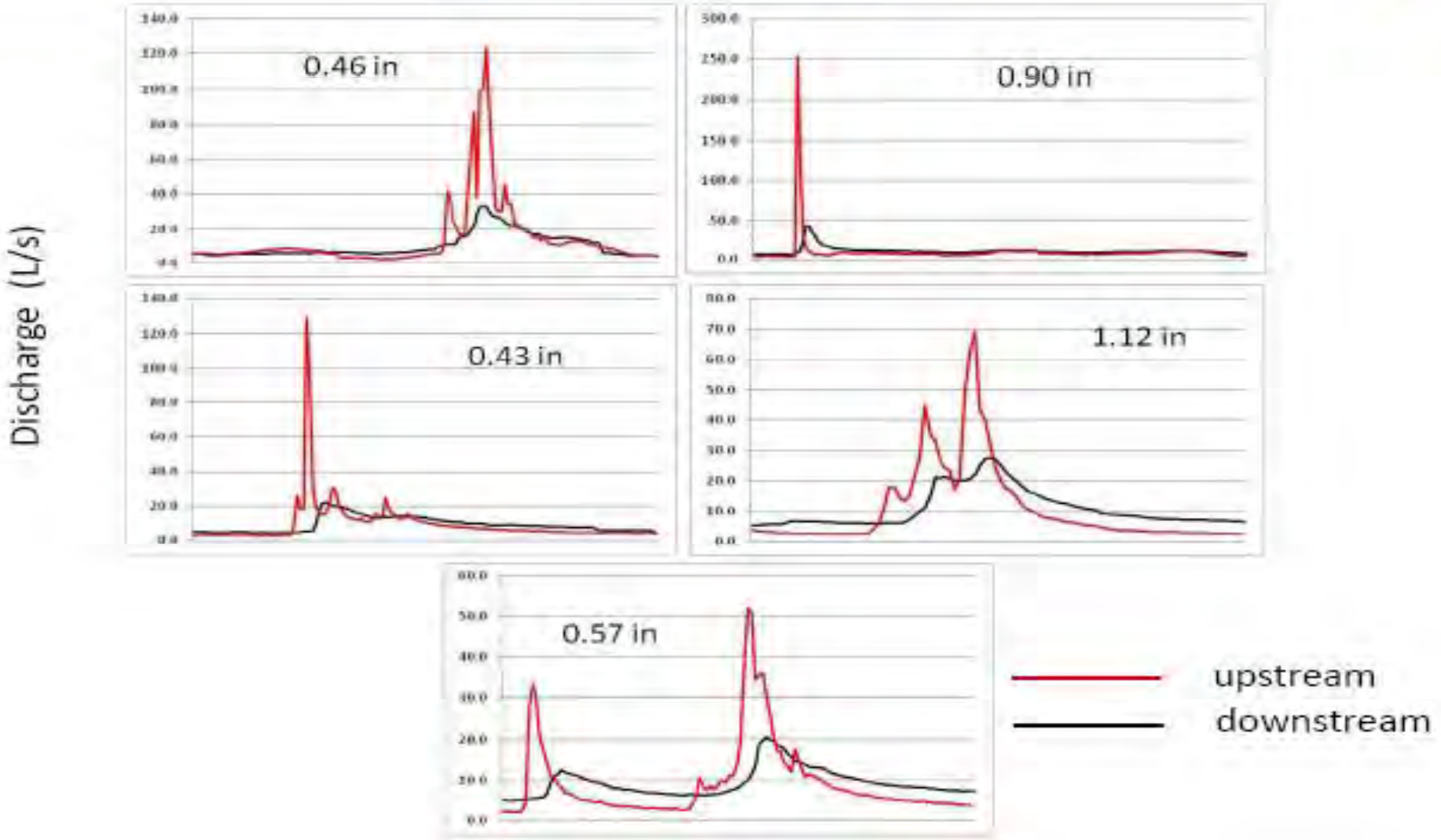

BROADNECK ROAD
EX. 12" S.D.
PROP. MOAT
PROP. POOL (TYP.)
L.O.D.
EX. STREAM LINE
PROP. MOAT
L.O.D.
EX. STREAM LINE
L.O.D.
PROP. COBBLE WIER (TYP.)
EX. STREAM LINE
PROP. MOAT
L.O.D.
L.O.D.
S 48°47'01" E 95.85'
S 59°12'27" E 108.58'
190.71'
S 89°22'29" W 632.66'
S 75°52'48"


top of seepage reservoir
bottom of seepage reservoir
seepage zone
seepage reservoir
capilarity
porous carbon-rich
seepage bed
seepage
infiltration
existing ground

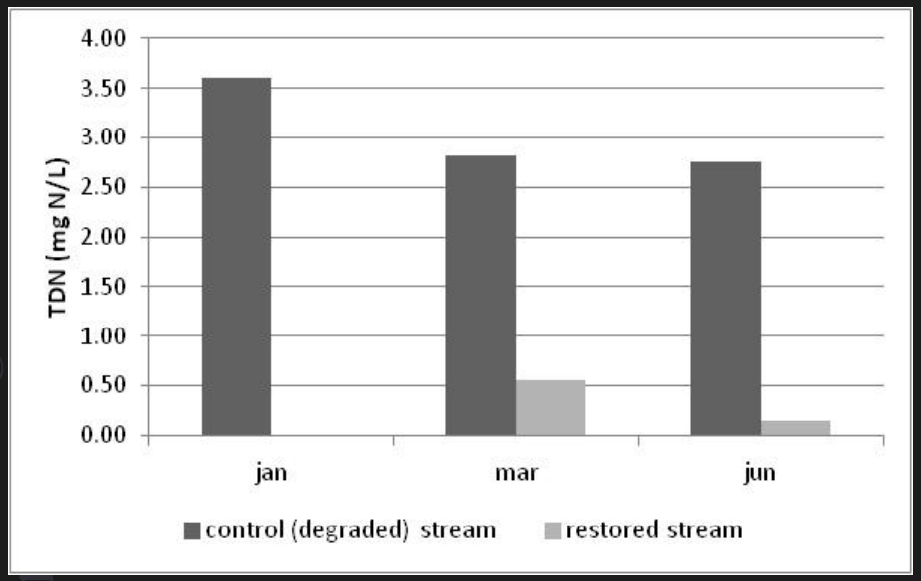


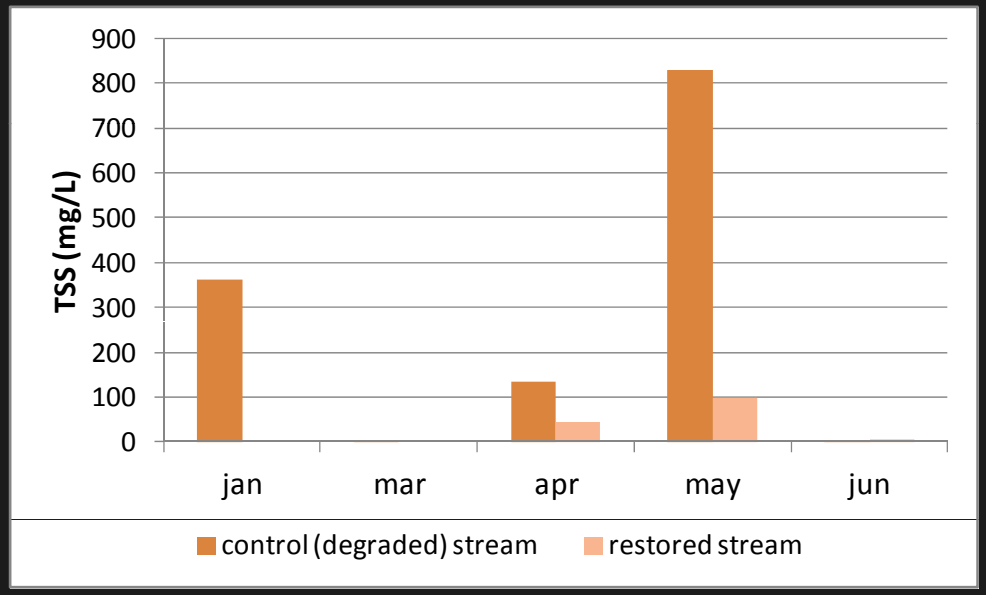
Source: Palmer and Filoso, 2009

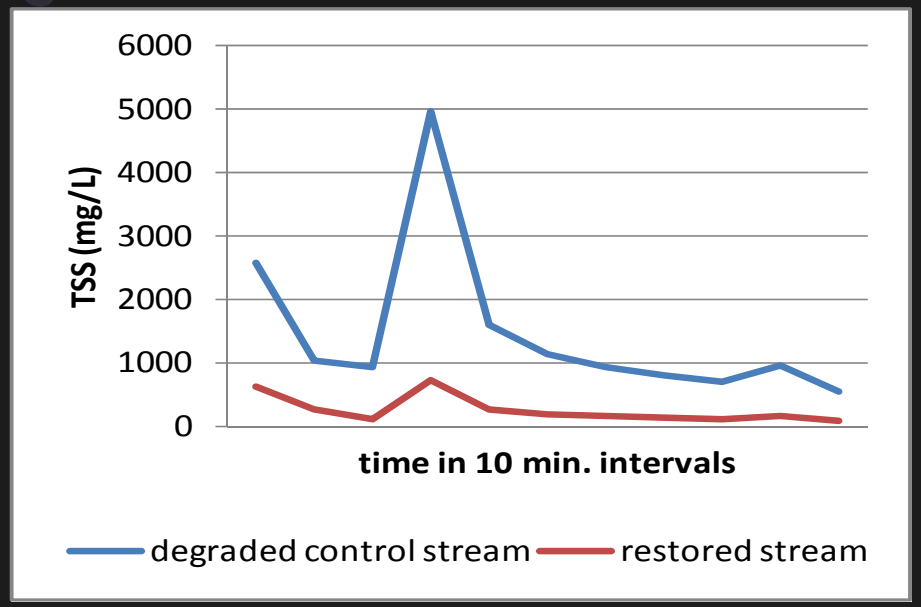
Hydrographs during individual storms WILELINOR

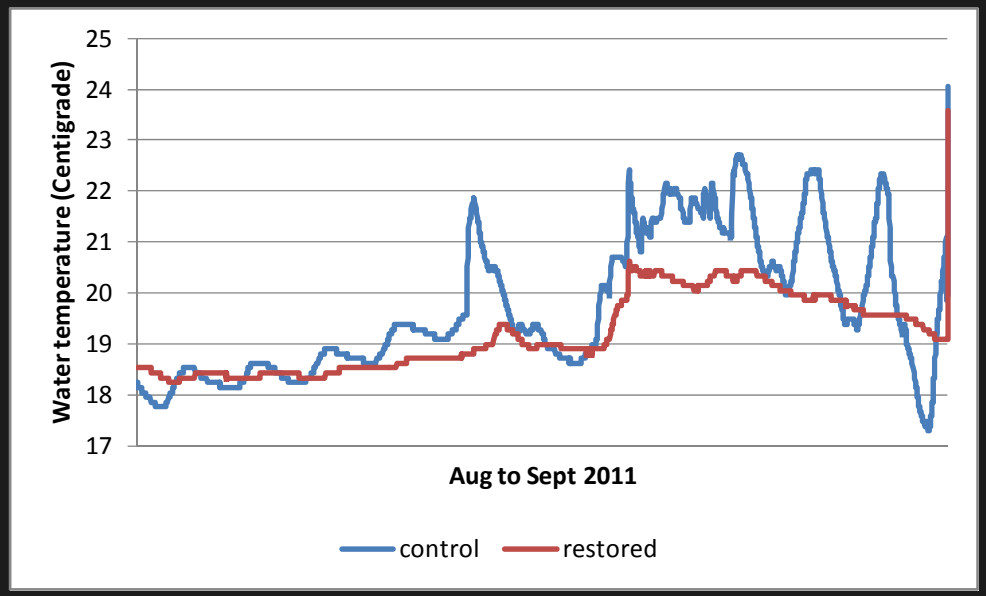


Source: Solange Filoso, University of Maryland









Carriage Hills,
Source: Solange Filoso, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory

ACCOUNTING FOR STORMWATER WASTELOAD ALLOCAT AND IMPERVIOUS ACRES TRI

GUIDANCE FOR NATIONAL POLLUTANT DISCHARGE ELIMINAT STORMWATER PERMITS

JUNE (DRAFT) 2011

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Table 4. Structural BMP Retrofit Matrix

BMP Practice	TN	TP	TSS
CBP Structural BMPs			
Dry Detention Ponds	5%	10%	10%
Hydrodynamic Structures	5%	10%	10%
Dry Extended Detention Ponds	20%	20%	60%
Wet Ponds and Wetlands	20%	45%	60%
Infiltration Practices	80%	85%	95%
Filtering Practices	40%	60%	80%
Vegetated Open Channels	45%	45%	70%
Erosion and Sediment Control	25%	40%	40%
Stormwater Management by Era			
Development Between 1985 - 2002	17%	30%	40%
Urban BMP Retrofit	25%	35%	65%
Development Between 2002 and 2010	30%	40%	80%
Development After 2010	50%	60%	90%
ESD to the MEP from the *Manual*			
Green Roofs	50%	60%	90%
Permeable Pavements	50%	60%	90%
Reinforced Turf	50%	60%	90%
Disconnection of Rooftop Runoff	50%	60%	90%
Disconnection of Non-Rooftop Runoff	50%	60%	90%
Sheetflow to Conservation Areas	50%	60%	90%
Rainwater Harvesting	50%	60%	90%
Submerged Gravel Wetlands	50%	60%	90%
Landscape Infiltration	50%	60%	90%
Infiltration Berms	50%	60%	90%
Dry Wells	50%	60%	90%
Micro-Bioretention	50%	60%	90%
Rain Gardens	50%	60%	90%
Grass, Wet, or Bio-Swale	50%	60%	90%
Enhanced Filters	50%	60%	90%
Additional Structural BMP Guidance			
Redevelopment (MDE)	50%	60%	90%
Existing Roadway Disconnect (MDE)	50%	60%	90%
Step Pool Storm Conveyance (MDE)	50%	60%	90%


Before and After at
Milkhouse

Before and After at Bingham


Mount Vernon

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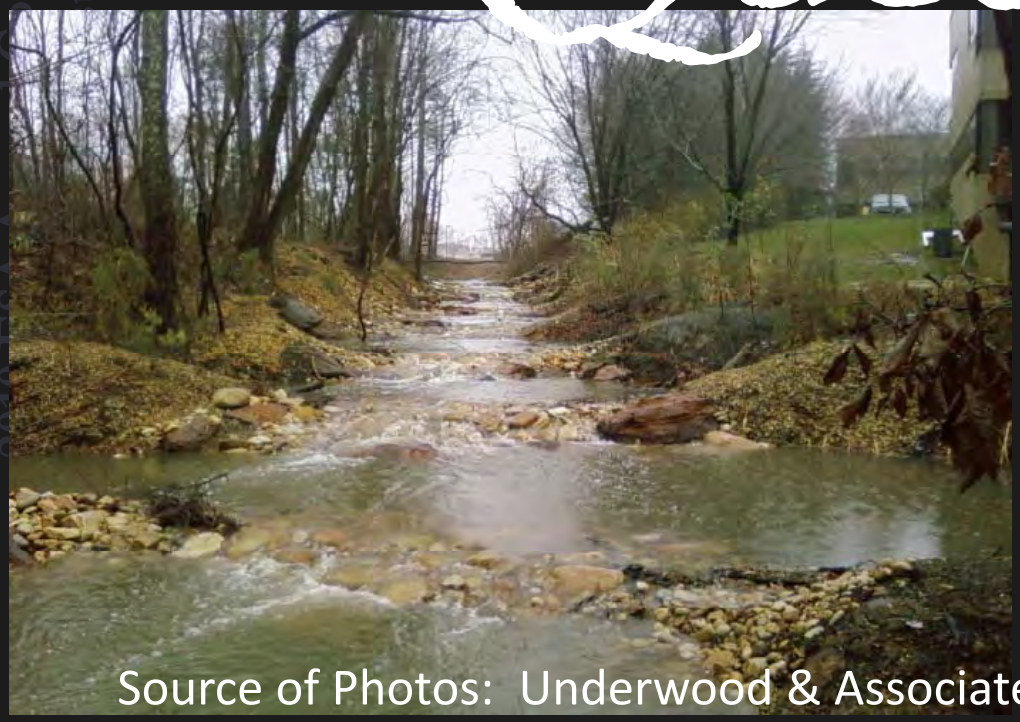
Questions?



Source of Photos: Underwood & Associates