

Case Study:
*Riparian Habitat Restoration for Improved
Water Quality and Habitat in Highly
Developed Suburban Watershed
West Whiteland Township Park, Exton, PA*



The Trusted Integrator for Sustainable Solutions



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Introduction

- Increased awareness of importance of riparian zone buffers as critical measure in restoring water quality and providing habitat for native wildlife
- WESTON partnered with West Whiteland Township to restore headwaters stream at Exton Park in Chester County, Pennsylvania





Site Background and Setting

- Exton Park - 727 acre tract formerly part of the Church Farm School property
- Site surrounds 1800s Pennypacker house. Land has been in continuous agricultural production
- West Valley Creek stream flows through site; within Brandywine Creek watershed that joins Delaware Estuary



Site Background and Setting

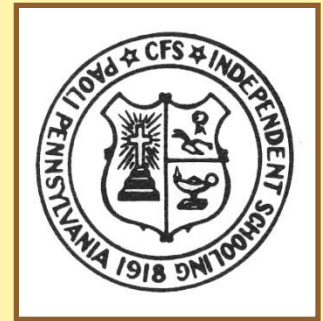
- West Valley Creek (limestone creek) supports sustainable trout population below park despite flowing through an area with moderately heavy commercial and residential development.
- At inception of project, row crops were planted within approximately 20 feet of stream with intermittently mowed grass to the edge of bank.



STAKEHOLDERS



- WESTON and Township worked closely together to balance best science with multiple stakeholders
- West Whiteland Township employees, supervisors and residents
- Users of the park: residents, nearby workers/businesses
- Careful consideration of Township Master Plan costs/budget, neighboring property concerns (School at Church Farm) and wildlife enthusiasts
- Coordination with Parks department, gas pipeline company and the farmer leasing land for crops

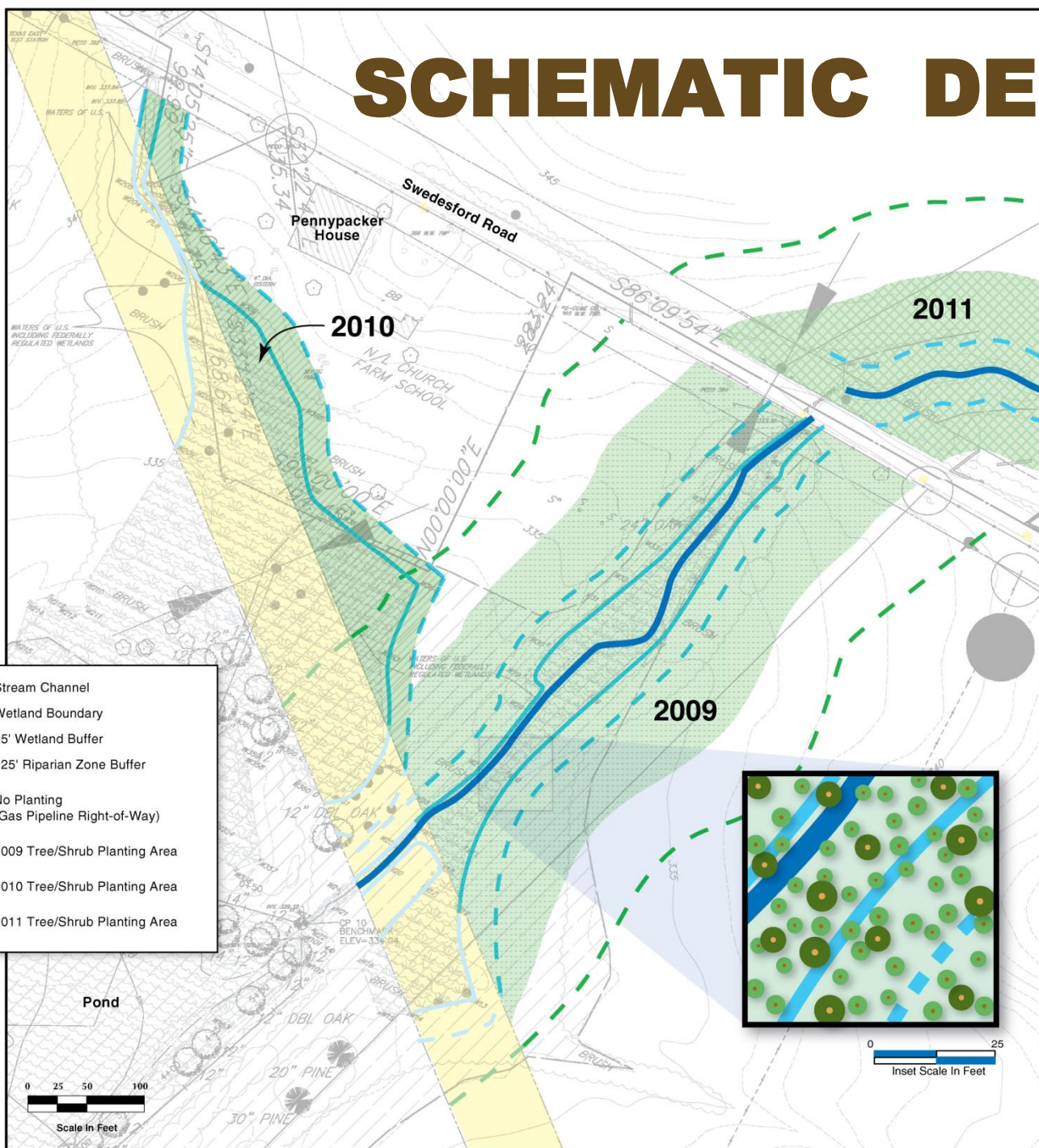












PLANNING

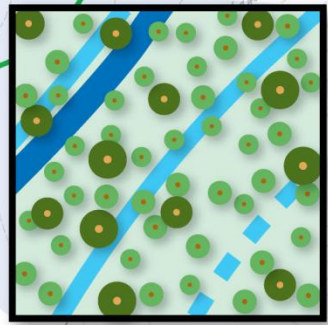
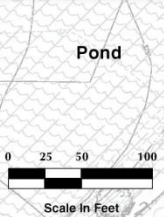
- Site walks with stakeholders
- Design guidelines drawn from Pennsylvania DEP Stream Releaf Forest Buffer Toolkit
- Careful examination of topographical and hydrological conditions within project area
- Selection of native trees and shrubs to effectively stabilize stream banks, provide shading and maximize diversity and utilization by wildlife.
- Preparation and review of a schematic design for implementation over multiple years
- Fall planting to minimize stress to container-grown nursery stock

SCHEMATIC DESIGN



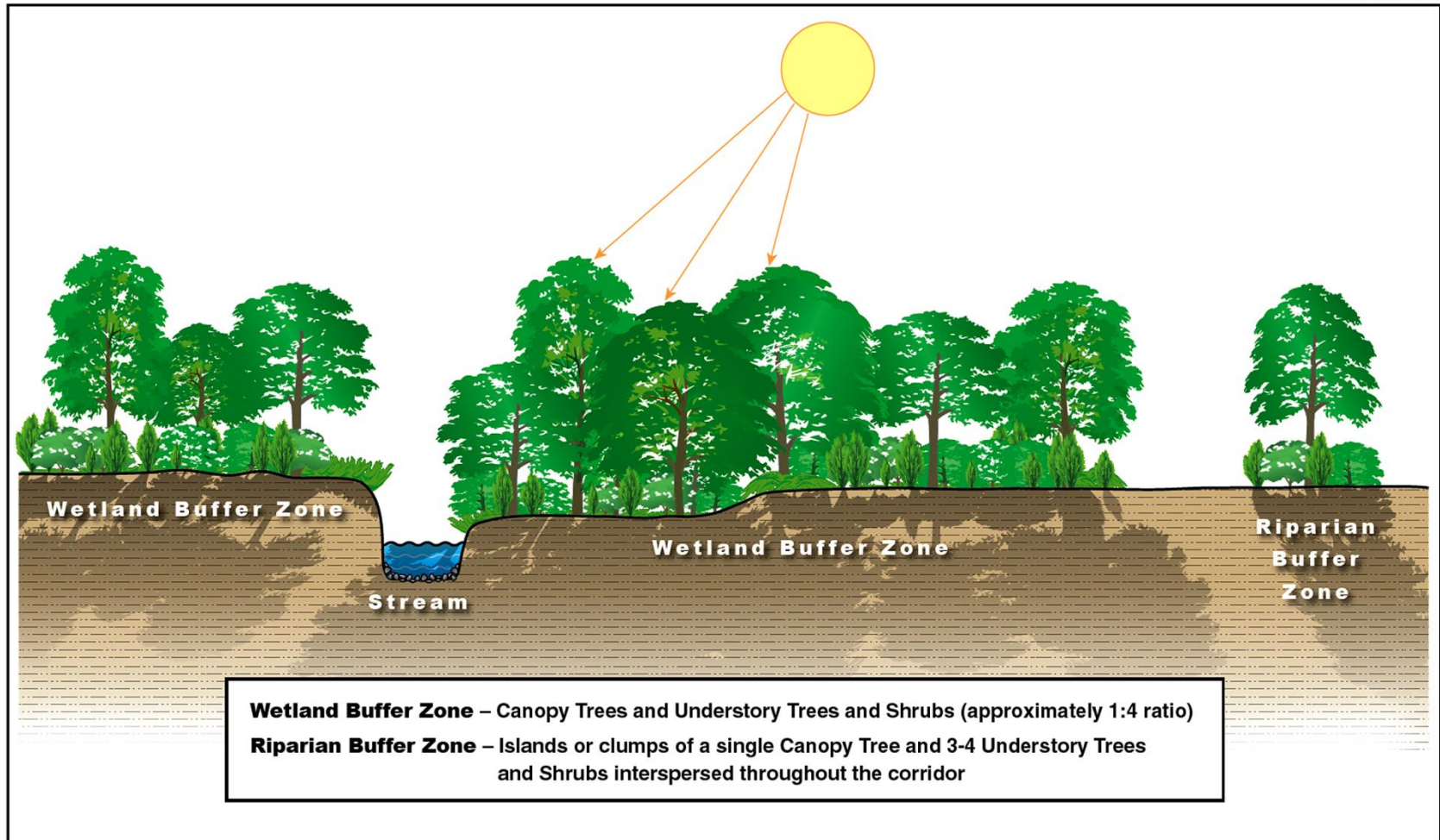
LEGEND

-  Stream Channel
-  Wetland Boundary
-  25' Wetland Buffer
-  125' Riparian Zone Buffer
-  No Planting (Gas Pipeline Right-of-Way)
-  2009 Tree/Shrub Planting Area
-  2010 Tree/Shrub Planting Area
-  2011 Tree/Shrub Planting Area





BUFFER ZONE CROSS SECTION





TREE/SHRUB SPECIES

COMMON NAME	SCIENTIFIC NAME	Wetland Buffer Zone	Upland Riparian Buffer Zone
CANOPY TREES			
Red maple	<i>Acer rubrum</i>	●	
Shagbark hickory	<i>Carya ovata</i>		●
White oak	<i>Quercus alba</i>		●
Swamp white oak	<i>Quercus bicolor</i>	●	
Red oak	<i>Quercus rubra</i>		●
Black willow	<i>Salix nigra</i>	●	
Basswood	<i>Tilia americana</i>		●
UNDERSTORY TREES/SHRUBS			
Smooth alder	<i>Alnus serrulata</i>	●	
Serviceberry (Shadblow)	<i>Amelanchier canadensis</i>	●	
American hornbeam	<i>Carpinus caroliniana</i>	●	
Hackberry	<i>Celtis occidentalis</i>		●
Redbud	<i>Cercis canadensis</i>		●
Summersweet	<i>Clethra alnifolia</i>	●	
Silky dogwood	<i>Cornus amomum</i>	●	
White flowering dogwood	<i>Cornus florida</i>		●
Grey dogwood	<i>Cornus racemosa</i>	●	
Red-osier dogwood	<i>Cornus sericea</i>	●	
Witchhazel	<i>Hammamelis virginiana</i>		●
Winterberry	<i>Ilex verticillata</i>	●	
Spicebush	<i>Lindera benzoin</i>	●	
Sandbar willow	<i>Salix exigua</i>	●	
Elderberry	<i>Sambucus canadensis</i>	●	
Sassafras	<i>Sassafras albidum</i>		●
Arrowwood	<i>Viburnum dentatum</i>		●
Nannyberry	<i>Viburnum lentago</i>		●
Blackhaw	<i>Viburnum prunifolium</i>		●



2009 PLANTING

- Focus on perennial eastern branch of stream with emphasis on wetland buffer zone immediately surrounding stream
- 430 trees and shrubs obtained from Octoraro Native Plant Nursery in PA
- Mixture of 14 understory tree and shrub species with 5 canopy tree species in approximately 3 – 4 : 1 ratio
- Predominantly wetland species due frequent overbank flows in the central reach of the stream
- Supplemented nursery stock with black willow stakes pre-prepared from established trees in vicinity



2010 PLANTING

- Focus on intermittent western branch of stream
- Secondary objective of filling in riparian buffer zone of eastern branch
- 640 trees and shrubs obtained from Octoraro
- Added upland species of 5 understory trees/shrubs and 2 canopy tree species to accommodate site hydrology
- Total of 19 understory tree and shrub species with 7 canopy tree species
- Local black willow stakes harvested and planted



SEPTEMBER 2011 PLANTING

- Focus on upstream reach of eastern branch of stream
- Secondary objective of maintaining 2009 and 2010 plantings by clearing invasive vines and shrubs, removing / reusing tree shelters and pruning
- Approximately 300 trees and shrubs with a similar mix to the 2011 planting and local black willow stakes planned
- Additional activities will include construction of boardwalks to traverse wet areas, invasives control, installation of benches and kiosk for informational signs, maps and interpretive materials.



ADVANCE ACTIVITIES

- Mow areas to be planted
- Harvest ~3/4 inch x 24 - 30 inch black willow stakes, dip top cuts in paraffin and pre-soak for ~ 1 week
- Receive nursery stock delivery and stage by species
- Label each tree or shrub with letter code for canopy trees and numeric code for understory trees and shrubs
- Place coded pin flags throughout planting area in semi-random pattern with ~16-18 ft on center spacing for canopy trees and ~6-8 ft on center spacing for understory trees and shrubs
- Auguring holes for larger stock



EVENT DAY ACTIVITIES

- Welcome and thanks to volunteers
- Why we are here
- Health and safety briefing
- Demonstration of correct planting techniques
- Roaming checks by experienced individuals on planting activities and installation of tree shelters
- 2009 – 150 volunteers from WESTON and Township employees, local residents and park users
- 2010 – 125 volunteers with the addition of Church Farm School staff and students and GAP employees engaged in community outreach projects



BRIEFINGS



HAND TOOLS





MANY HANDS



















QUESTIONS?



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Property
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Design/Build
Construction