

Baltimore County
Department of Environmental Protection & Sustainability



**DULANEY VALLEY BRANCH
AT WINDEMERE
STREAM RESTORATION PROJECT**



October 24, 2017

INTRODUCTIONS



▶ Baltimore County EPS

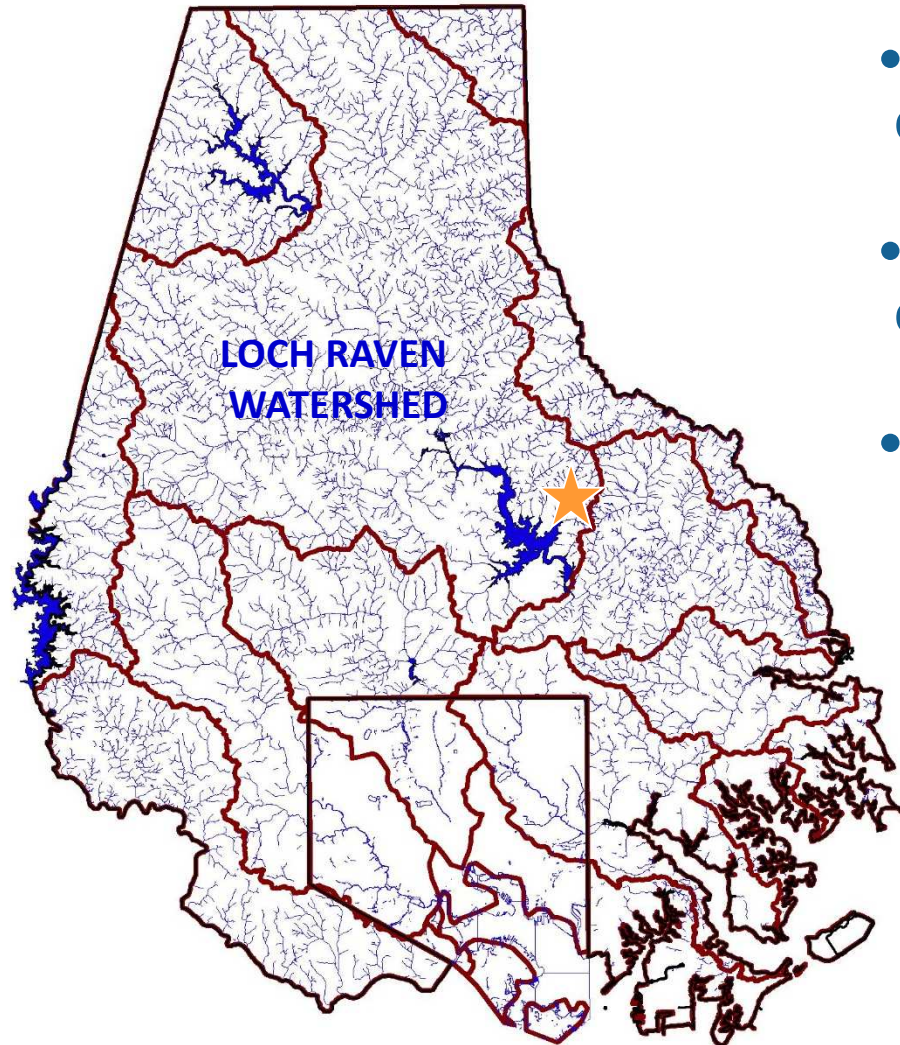
- Lisa Bledsoe, *County Project Manager*
- Heather McGee, *Assistant Project Manager*
- Joanie Beam, *Stream Restoration Supervisor*

▶ McCormick Taylor

- Mike Miller, *Design Consultant Project Manager*
- Lindsay Nicoll, *Design Consultant Project Manager*



BALTIMORE COUNTY, MARYLAND

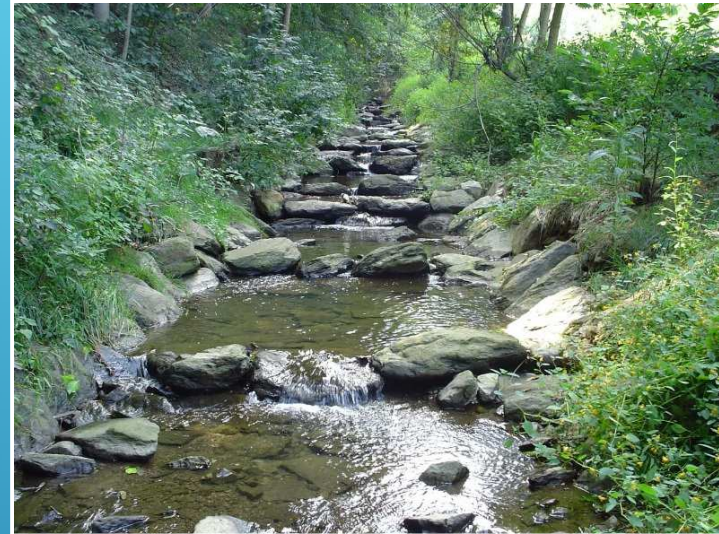


- 2,145 miles of streams
- 219 miles of shoreline
- 14 major watershed basins

WATERSHED RESTORATION SECTION OVERVIEW



Water Quality Retrofits



Stream Restoration



Shoreline Enhancement



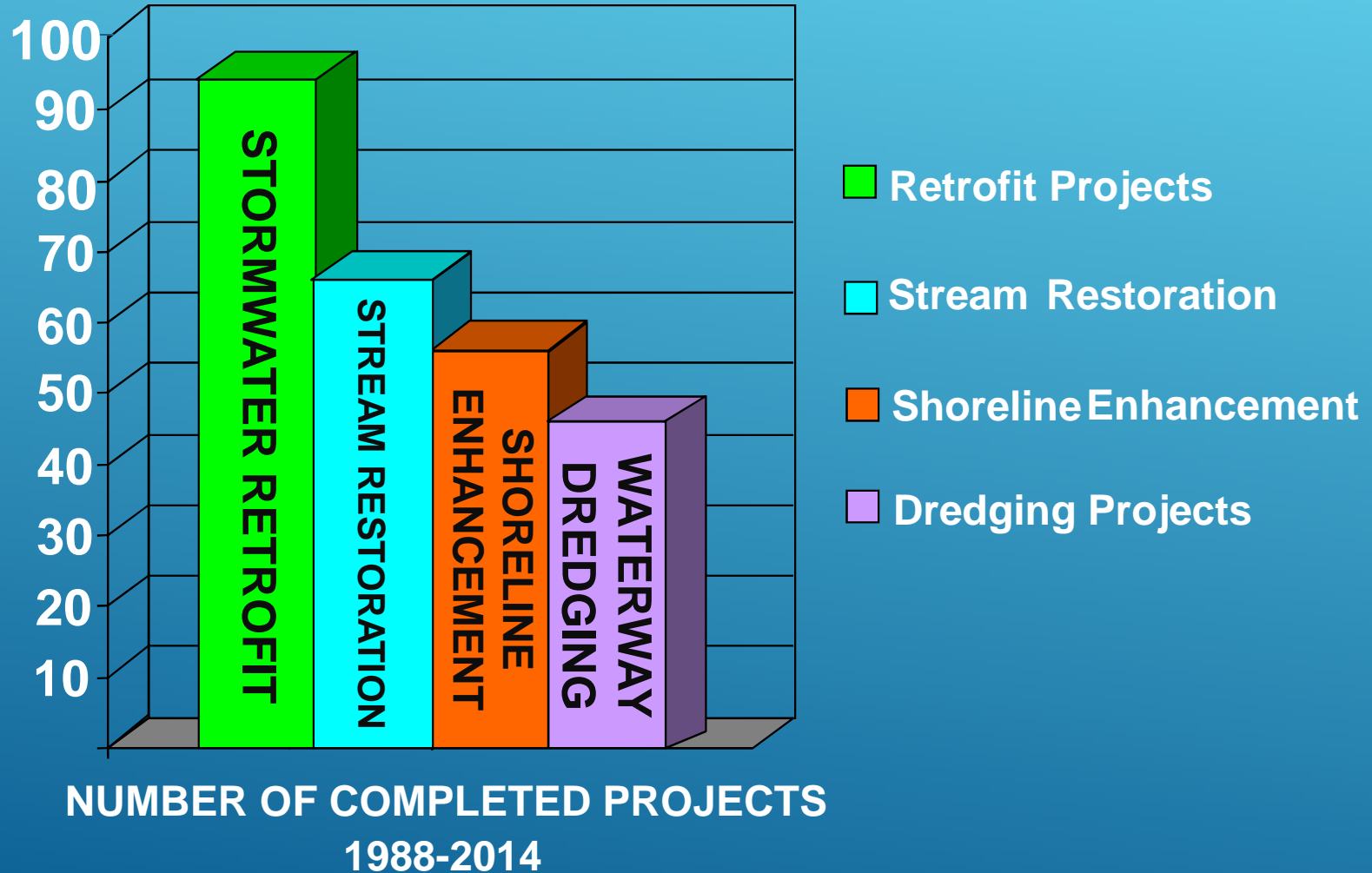
Waterway Dredging

PROGRAM GOALS

Identify and implement projects which:

- ▶ Improve water quality
- ▶ Reduce non-point sources of pollution
- ▶ Increase aquatic and riparian habitat
- ▶ Protect infrastructure
- ▶ Reduce loss of property from erosion
- ▶ Efficiently utilize program resources

RESTORATION EFFORTS TO DATE



CAUSES OF STREAM INSTABILITIES:

Increased impervious area → Increased volume and/or velocity of stream flows during storm events; decreased base flow; more pollutants entering stream

Lack of riparian buffer → Destabilization of stream banks and/or bed which leads to erosion; increased water temperatures; limited pollutant removal

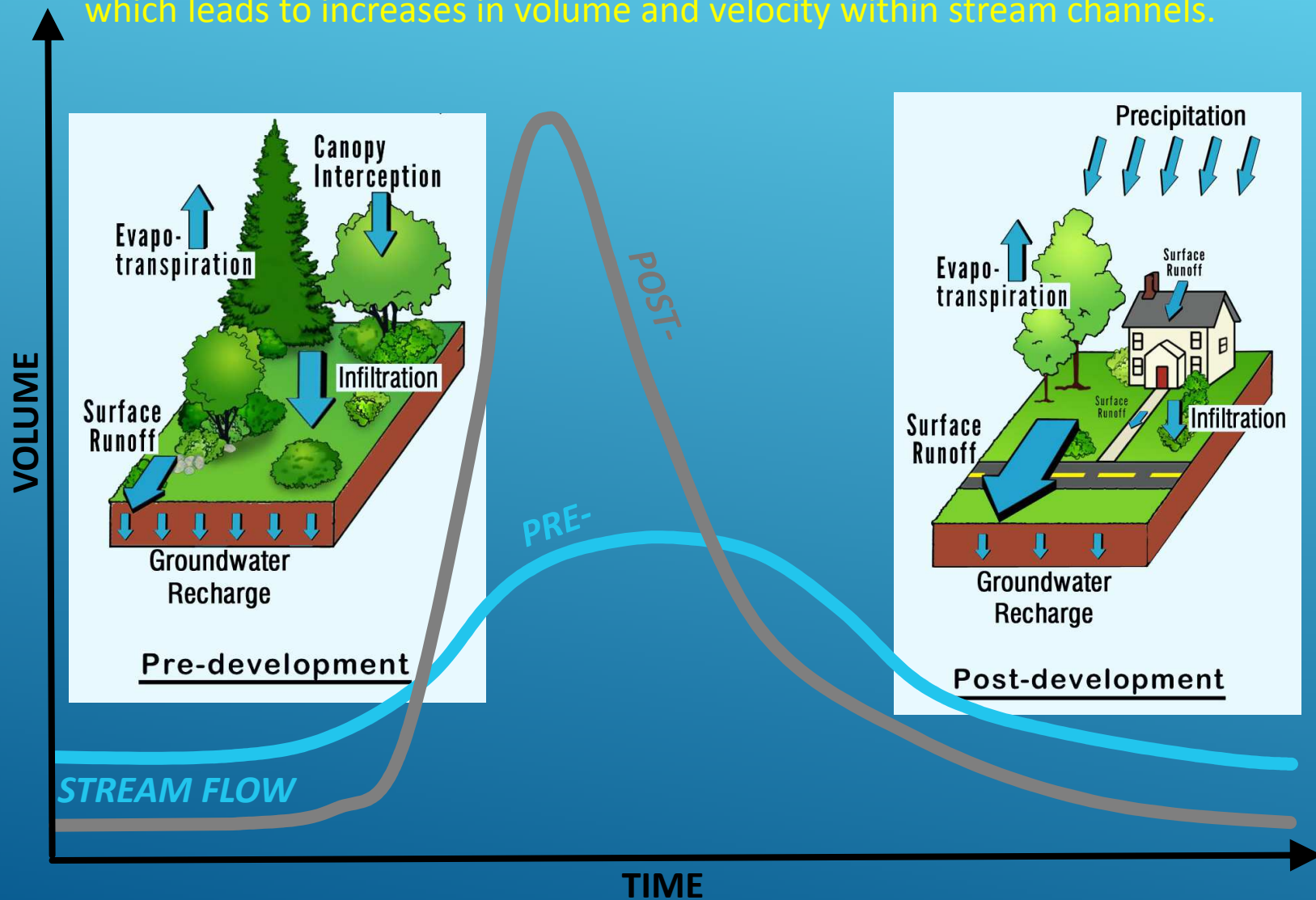
Modifications to channel → Loss of environmental functionality such as groundwater recharge, wildlife habitat, sediment transport, and pollutant removal

Infrastructure encroachment → Flooding and damage to public and private property

Increased pollutant loads → Impaired water quality and aquatic habitat

TYPICAL HYDROGRAPH

Increases in impervious surface short circuits the natural hydrologic cycle which leads to increases in volume and velocity within stream channels.



PROJECT OBJECTIVES

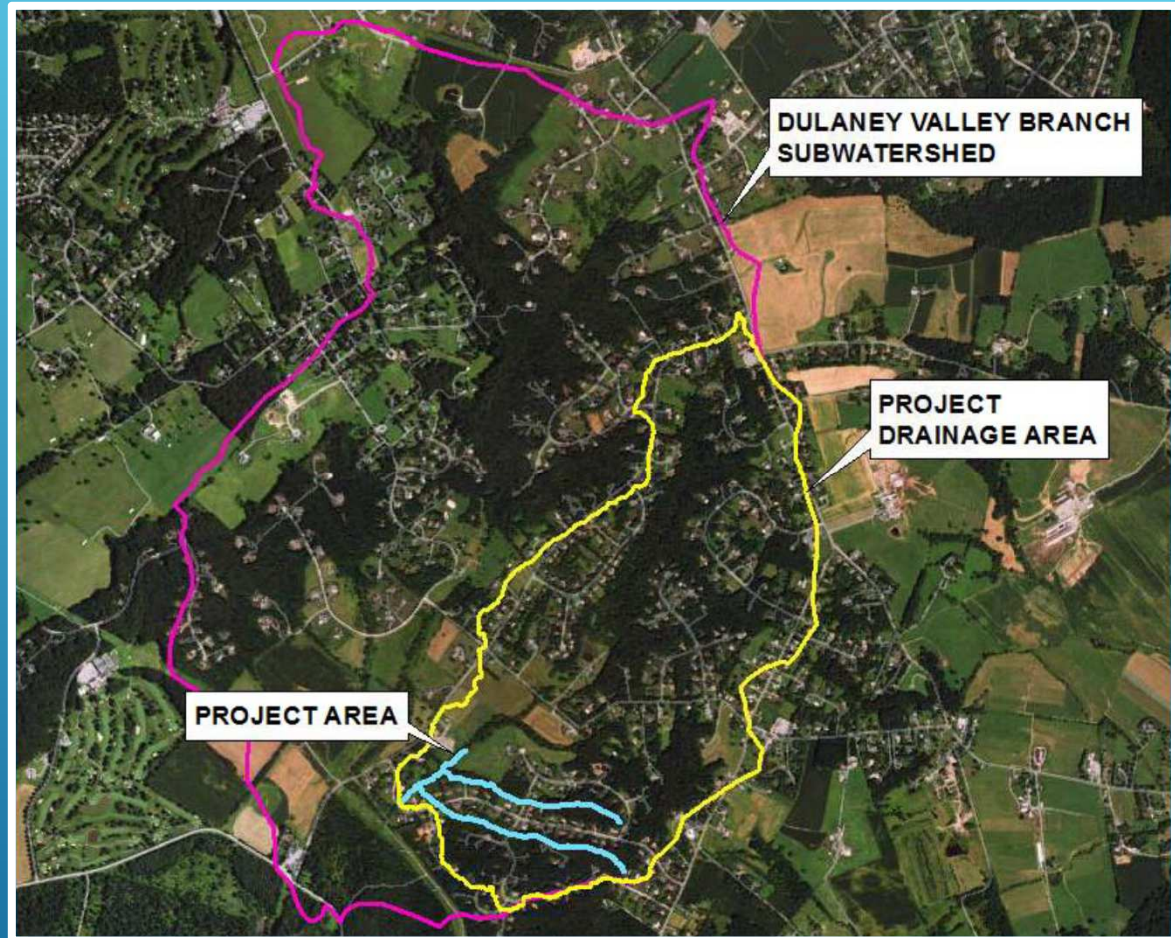
- ▶ Identify and document existing conditions of the stream
- ▶ Identify opportunities for stream stabilization
- ▶ Identify additional opportunities for water quality improvement and stormwater management
- ▶ Create reach-specific restoration and stabilization concepts that will reduce erosion and downstream sedimentation
- ▶ Determine which areas of the channel would potentially benefit most from stabilization or restoration based on existing impaired channel conditions

SITE ASSESSMENT

- ▶ Pre-site investigation and document review
- ▶ Survey of existing channel conditions
- ▶ Assessment of existing and maximum build-out hydrologic inputs including stormwater management
- ▶ Inventory of on-site natural resources
- ▶ Analysis of existing and proposed hydraulic calculations to ensure stability of channel and no or minimal increase to 100-year water surface elevation

EXISTING CONDITIONS/FINDINGS

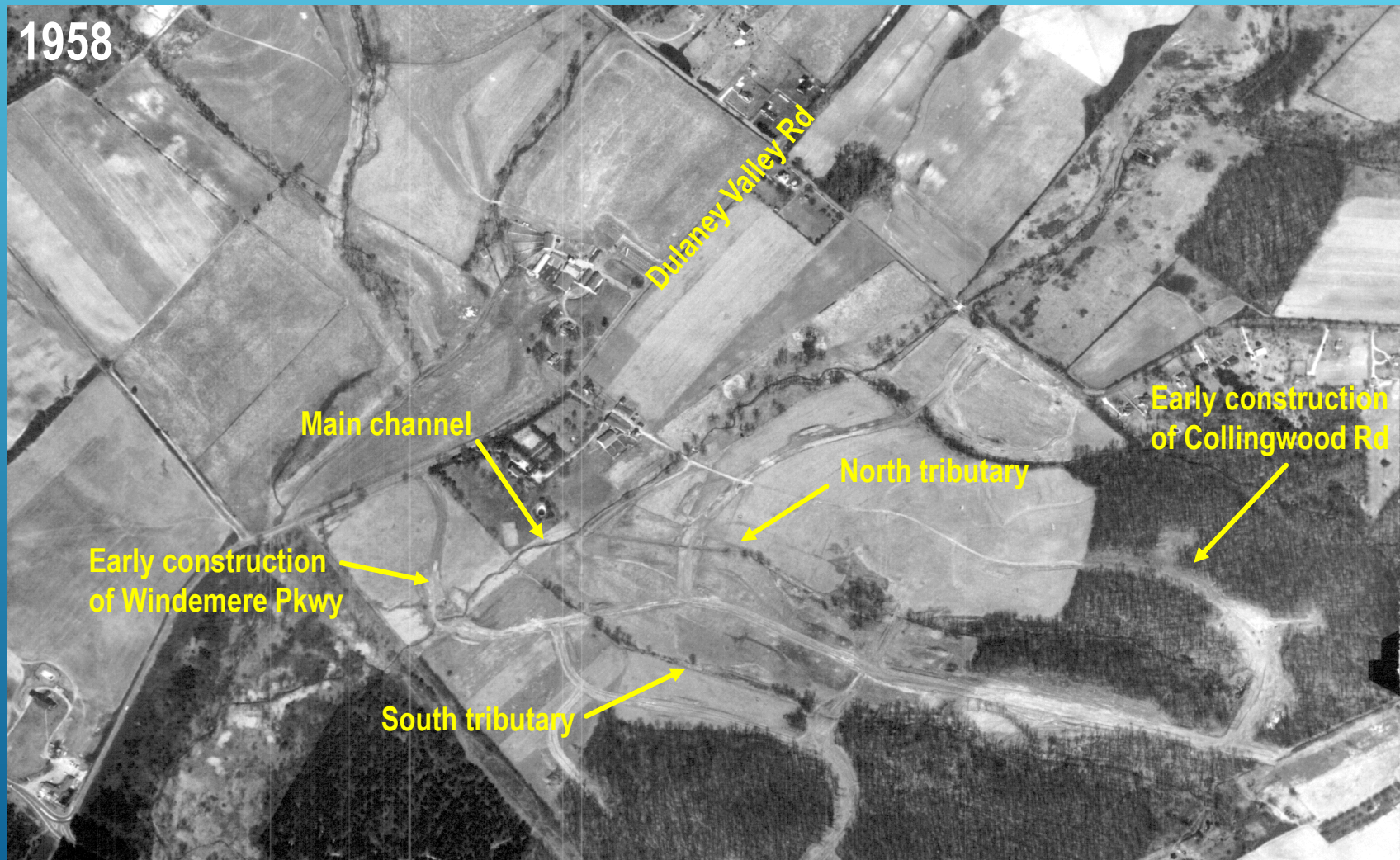
- ▶ The drainage area of these tributaries to Dulaney Valley Branch is 687 acres, 17% of which is impervious surface.
- ▶ Land use within the watershed is primarily residential, with some areas of forest and minimal areas of commercial use.



EXISTING CONDITIONS/FINDINGS

- ▶ Historical mapping indicates that prior to development in the early 1960's, the project area was primarily agricultural and forested. Forest clearing, straightening of channels, and increases in impervious cover have caused significant degradation of the stream.
- ▶ All these factors have contributed to the existing incised channel and “flashy” flow regime.

HISTORICAL AERIAL IMAGERY



PROJECT ASSESSMENT AREA



Dulaney Valley Branch at Windemere

0 125 250 500 750 1,000
Feet

EXISTING CONDITIONS/FINDINGS

- ▶ Channel conditions – Unstable storm drain infrastructure



Undercut storm drain outfall at Siesta Garth



Severe down-cutting at storm drain headwall

EXISTING CONDITIONS/FINDINGS

- ▶ Channel conditions – exposed/threatened utility poles



Pole exposed within eroded channel



Pole within close proximity of actively eroding channel

EXISTING CONDITIONS/FINDINGS

▶ Channel conditions – Significant erosion



The channel has incised to a degree that larger storm events remain constricted within the stream banks. This increases shear stress on the banks and erodes the streambed, furthering stream degradation.

EXISTING CONDITIONS/FINDINGS

- ▶ Channel conditions – Poor riparian buffers

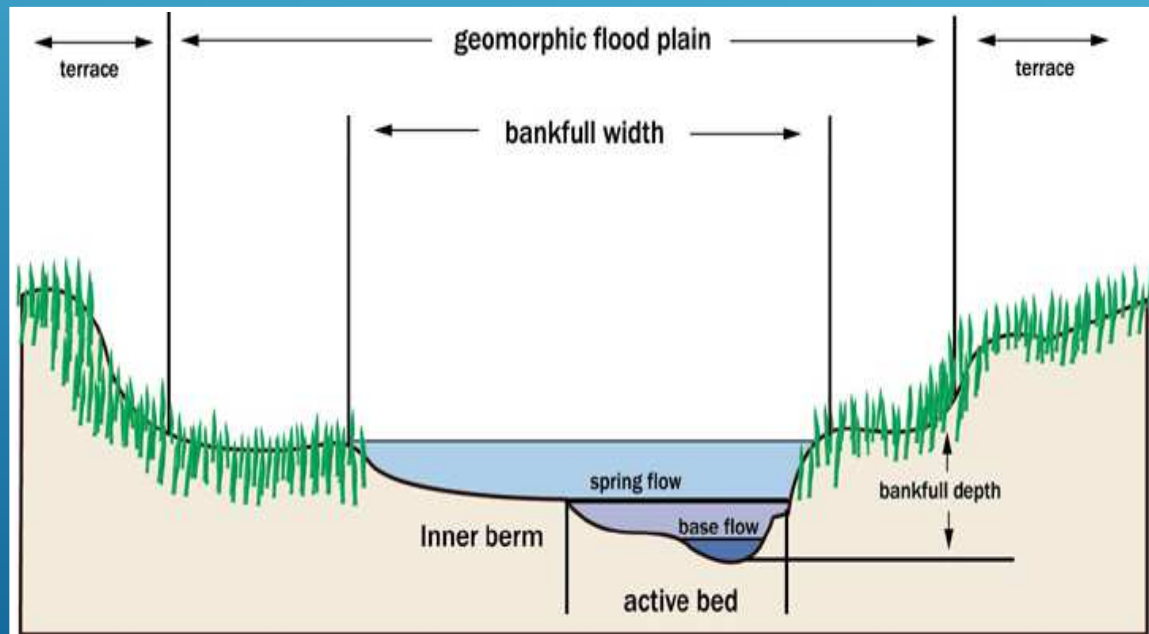


Lack of vegetated riparian area, mowing to edge of bank



RESTORATION TECHNIQUES USING NATURAL CHANNEL DESIGN

- Create a channel that can convey a variety of flows while maintaining sediment transport
- Adjust channel cross section shape to reduce bank stress
- Reconnect active channel to floodplain where feasible



Channel Shape Adjustments

RESTORATION TECHNIQUES USING NATURAL CHANNEL DESIGN

▶ Bank Stabilization

- rock toe protection, soil lifts, vegetated banks



Rock toe protection soon after construction



Soil lifts and vegetated banks soon after construction

RESTORATION TECHNIQUES USING NATURAL CHANNEL DESIGN

- ▶ Bed stabilization / grade control structures
 - step pools, riffle grade control

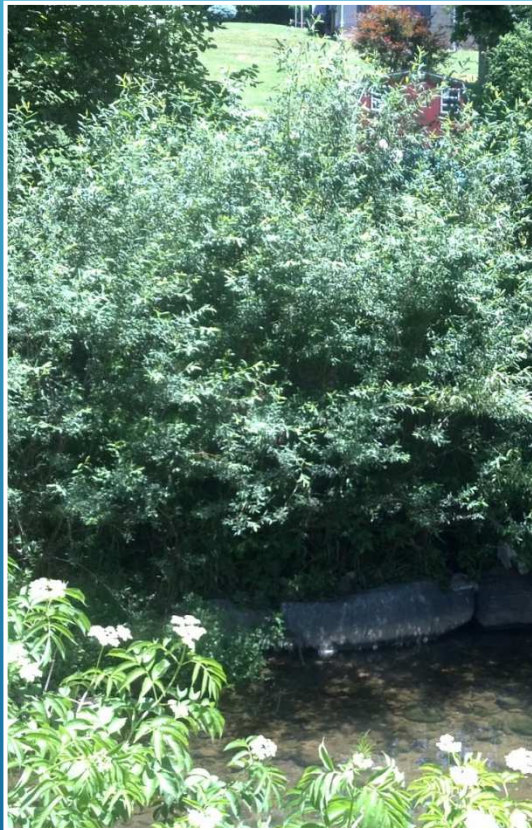


Step pools expend energy vertically –
Goodwin Run, completed 2001



Cascade structures provide stability in
steep areas, while also providing habitat
for fish and aquatic insects – East
Beaverdam II, completed 2014

RESTORATION TECHNIQUES USING NATURAL CHANNEL DESIGN



Gwynns Falls at Gwynnbrook
Ave, completed 2009

- ▶ Soil Bioengineering
 - stabilizes stream banks
 - reduces pollution entering stream



Redhouse Run at
St Patrick Road,
completed 2011

RESTORATION TECHNIQUES USING NATURAL CHANNEL DESIGN

▶ Riparian Buffer Enhancement

- provides shade & cover for improved habitat

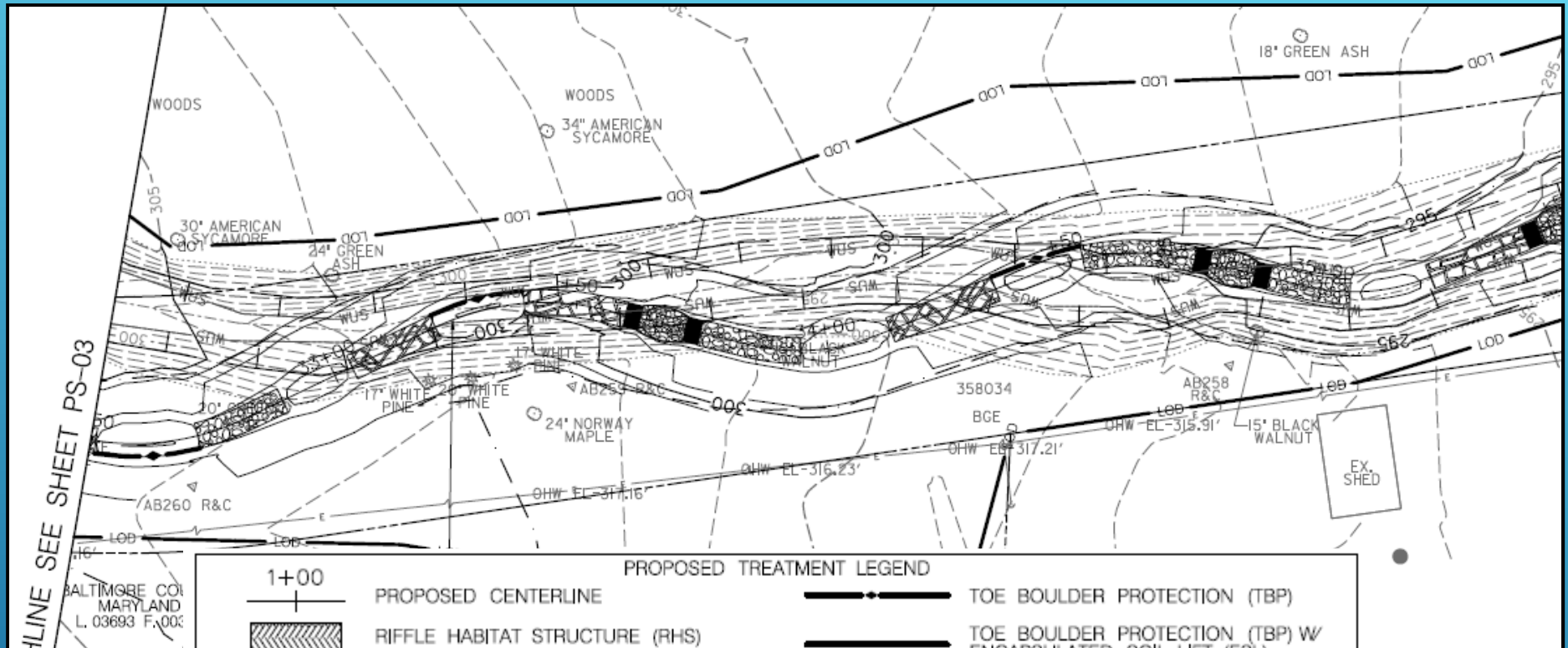


Hampton Branch – completed 2004



Minebank Run Phase II – completed 2005

RESTORATION CONCEPTS

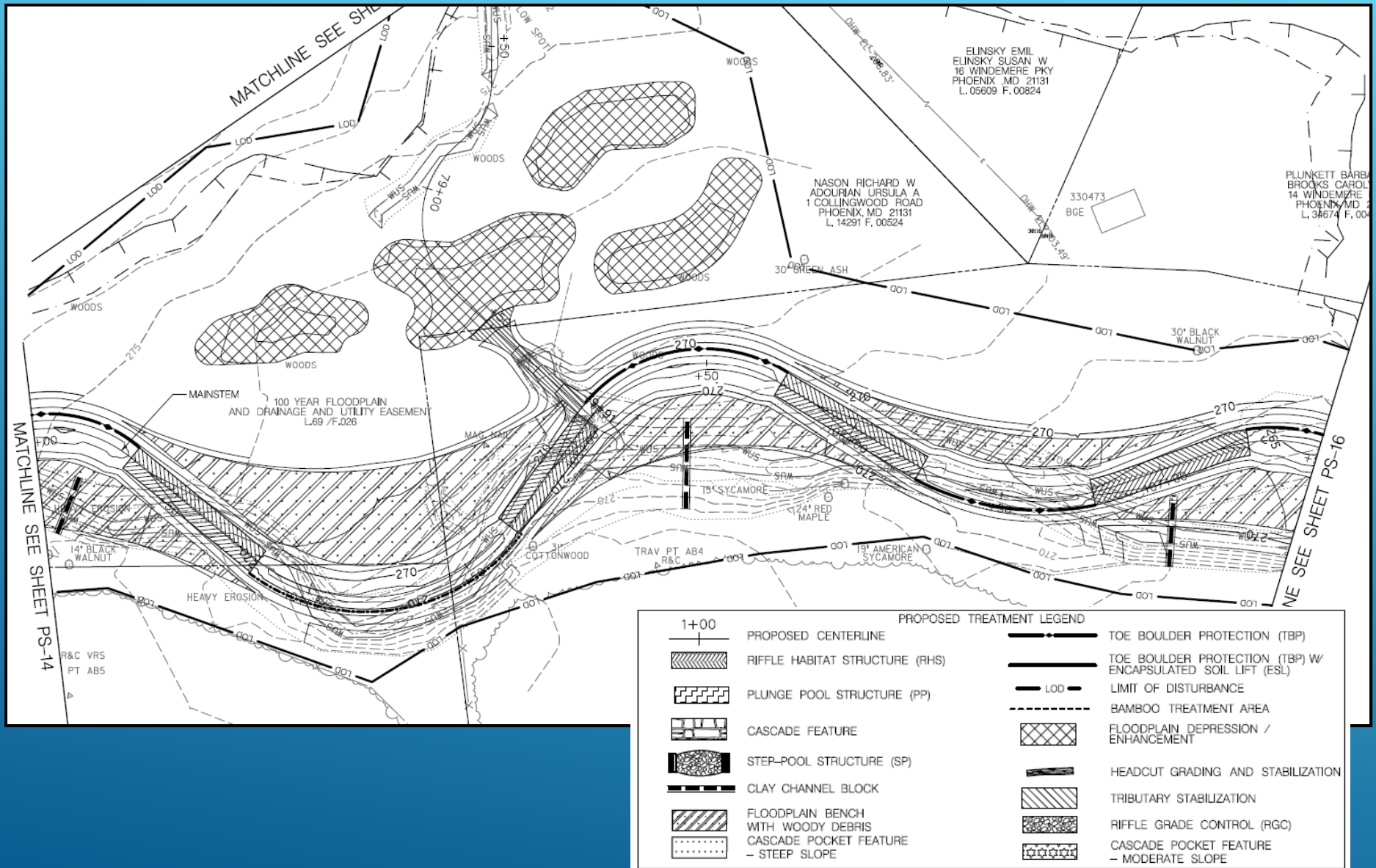


PROPOSED TREATMENT LEGEND

<p>1+00</p> <p>PROPOSED CENTERLINE</p> <p>RIFFLE HABITAT STRUCTURE (RHS)</p> <p>PLUNGE POOL STRUCTURE (PP)</p> <p>CASCADE FEATURE</p> <p>STEP-POOL STRUCTURE (SP)</p> <p>CLAY CHANNEL BLOCK</p> <p>FLOODPLAIN BENCH WITH WOODY DEBRIS</p> <p>CASCADE POCKET FEATURE - STEEP SLOPE</p>	<p>TOE BOULDER PROTECTION (TBP)</p> <p>TOE BOULDER PROTECTION (TBP) W/ ENCAPSULATED SOIL LIFT (ESL)</p> <p>LIMIT OF DISTURBANCE</p> <p>BAMBOO TREATMENT AREA</p> <p>FLOODPLAIN DEPRESSION / ENHANCEMENT</p> <p>HEADCUT GRADING AND STABILIZATION</p> <p>TRIBUTARY STABILIZATION</p> <p>RIFFLE GRADE CONTROL (RGC)</p> <p>CASCADE POCKET FEATURE - MODERATE SLOPE</p>
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SEE SHEET PS-03
BALTIMORE CO
MARYLAND
L. 03693 F. 003

RESTORATION CONCEPTS



CONSTRUCTION PHASE - Ugly but temporary!



Contractors are pre-qualified by the County; must submit proof they have completed similar projects



Construction timeframes are dictated by a closure period. For Dulaney Valley Branch, construction may not occur between October 1 and April 30

COMPLETED BALTIMORE COUNTY PROJECTS



Lower Spring Branch – completed 2008

Gwynns Falls at Chartley – completed 2008



SUMMARY

- ▶ Stabilize the two tributaries and the main stem that flow to Dulaney Valley Branch in the Windemere community
- ▶ Reduce erosion and pollution within the tributary
- ▶ Improve water quality and ecological function within the tributary
- ▶ Ultimately, improve conditions within Dulaney Valley Branch and the Loch Raven Reservoir watershed

