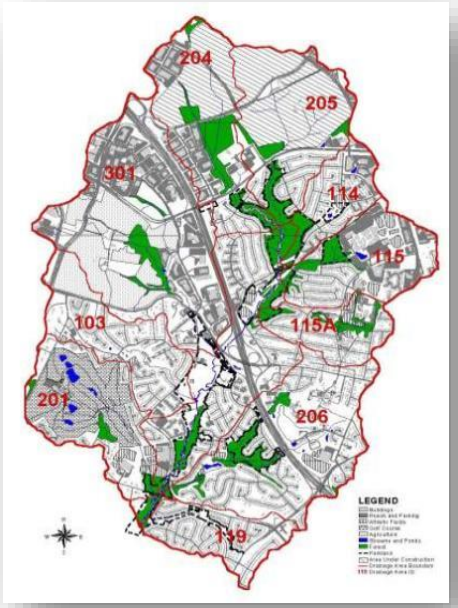
Next Steps in Stream Restoration Crediting



CHESAPEAKE STORMWATER NETWORK

Chesapeake Stormwater Network

May 6, 2020

www.chesapeakestormwater.net

5 New Stream Restoration Groups

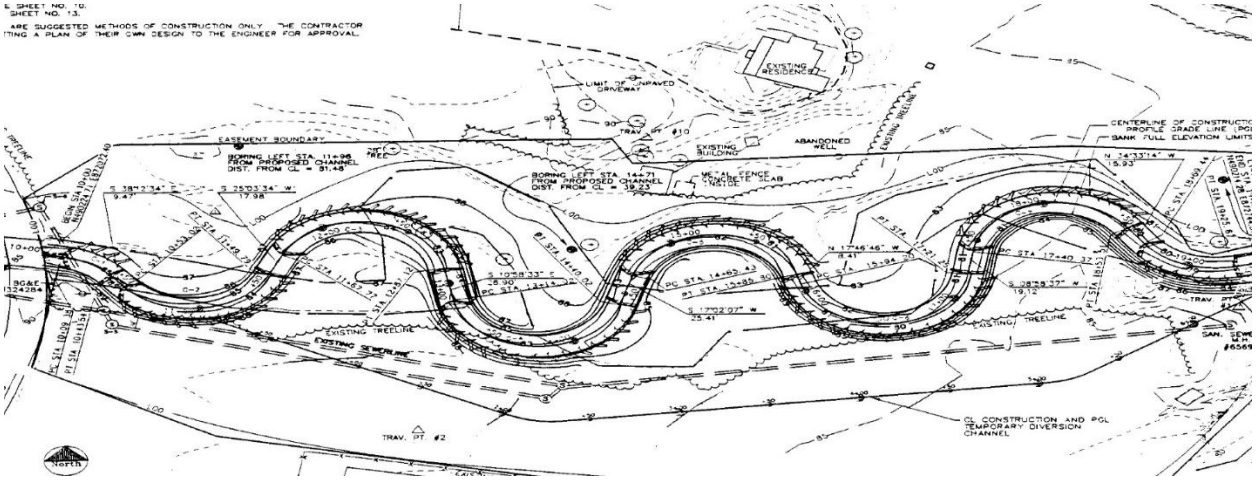
The Bay Program formed five groups to revisit the stream restoration expert panel report

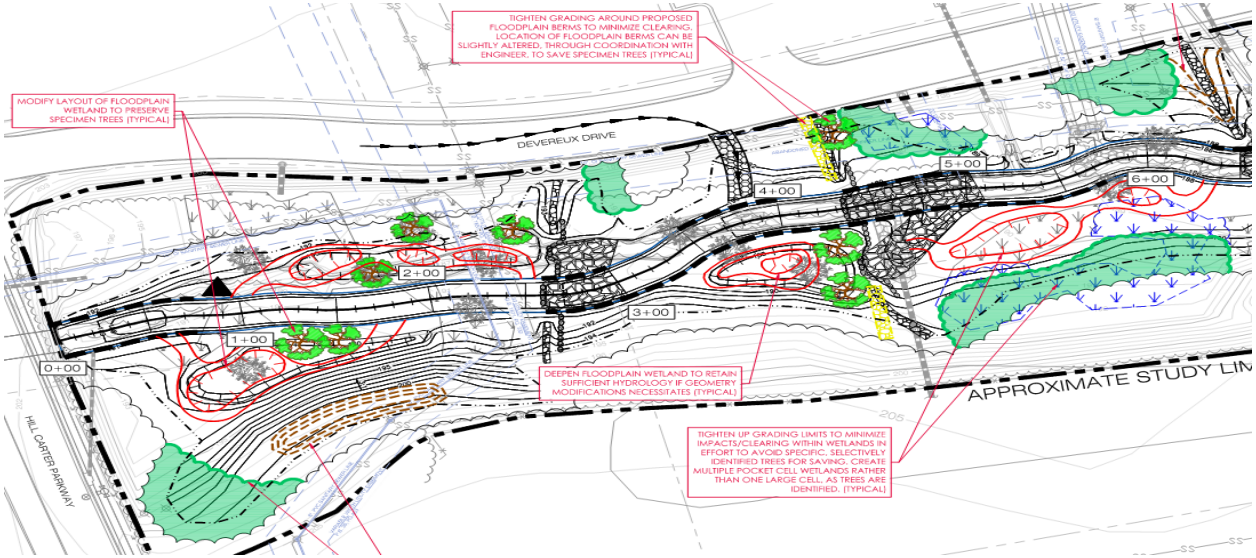
1. Verifying Stream Restoration Practices
2. Crediting Outfall Stabilization Practices
3. Standards for Protocol 1 (Prevented Sediment)
4. Adjusting Protocol 2/3 to Capture Floodplain Reconnection
5. Applying Protocols to Legacy Sediment Removal Projects

What has been accomplished so far

- Developed most rigorous verification protocols for any class of BMP in any Bay sector
- Expanded crediting to headwater erosion hotspots (gullies and zero order streams below outfalls)
- Tighter field and office standards for using all three protocols
- Hard limits on bank armoring
- Other environmental restrictions for stream projects
- No more default rate cheating

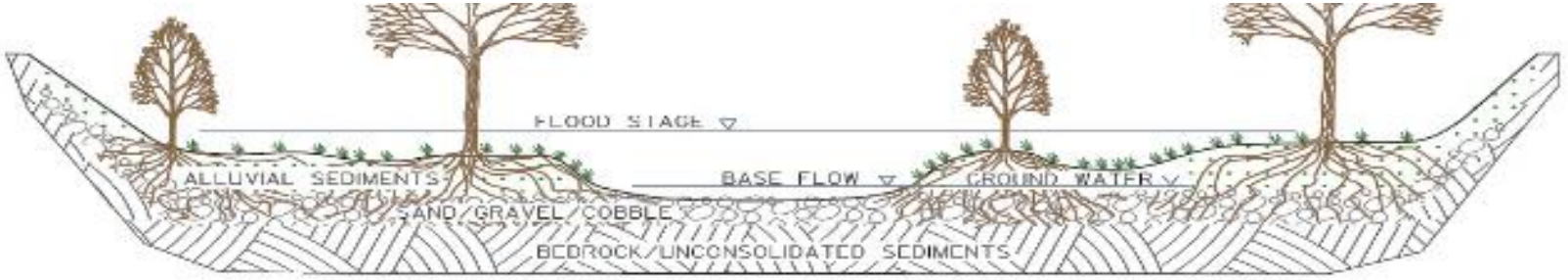
Evolution of Stream Restoration Design from Channel to the Floodplain



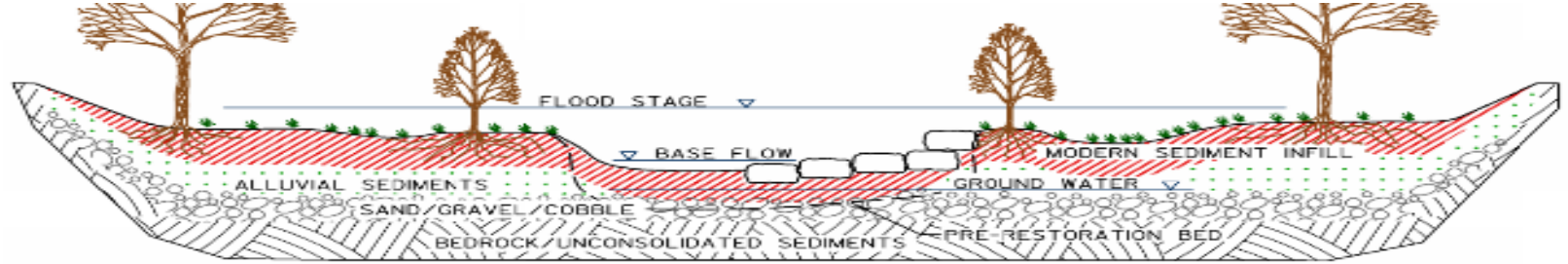


FR-LSR vs. FR-RSB

FR-LSR	Floodplain Restoration-Legacy Sediment Removal is a restoration approach where legacy sediments are removed from the floodplain, thereby reducing bank heights and increasing the annual stream runoff volume diverted into the floodplain and reconnected to the hyporheic aquifer.



FR-RSB	Floodplain Restoration-Raising the Stream Bed is a restoration approach where incised or degraded stream channels are filled with native materials to elevate the stream invert, thereby increasing the annual stream runoff volume diverted into the floodplain.

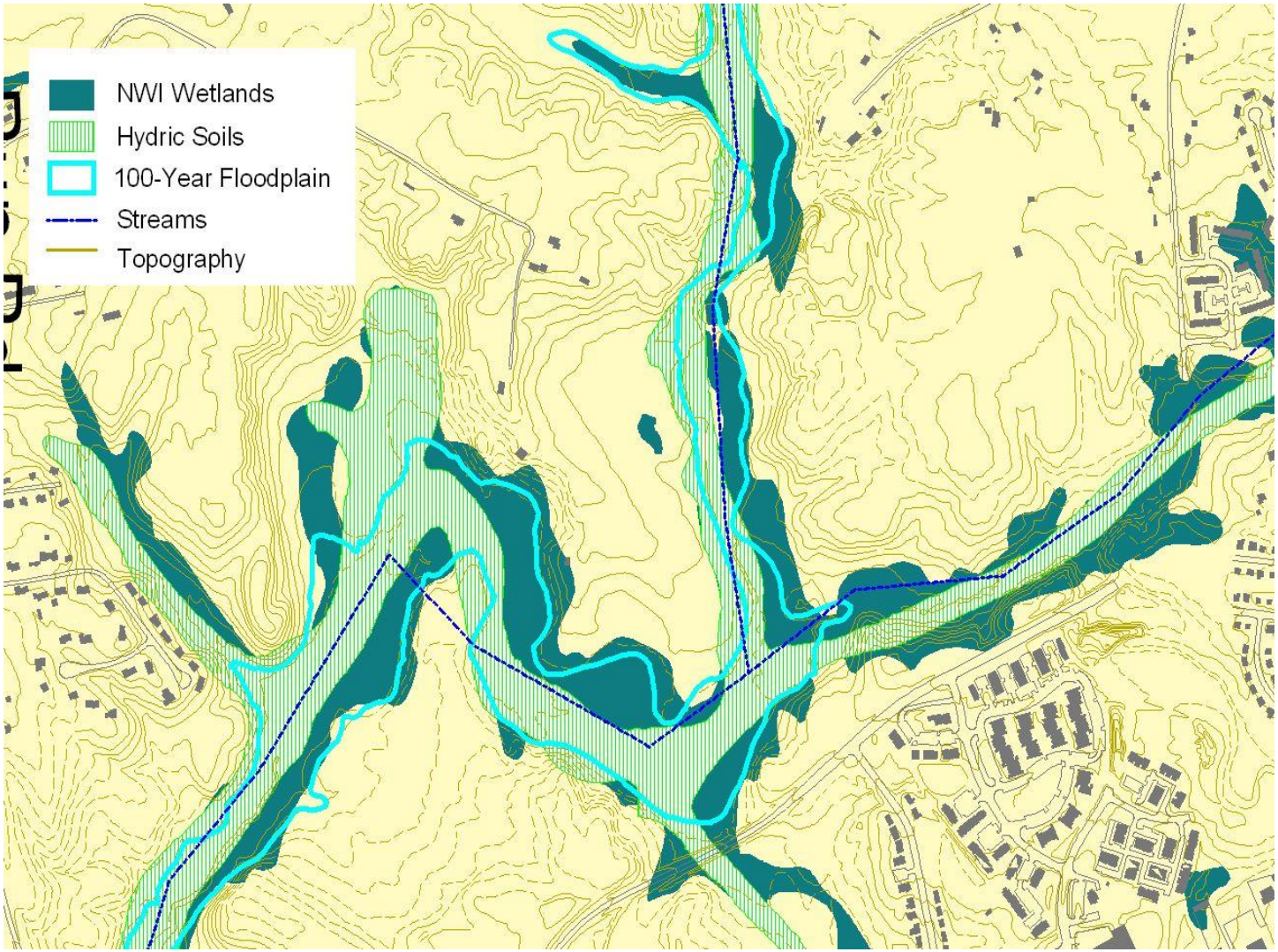


Environmental Considerations

Credit: Mike Rahnis, UNAVCO, Dorothy Merritts and Robert Walter

We all have a lot of biases when it comes to stream restoration

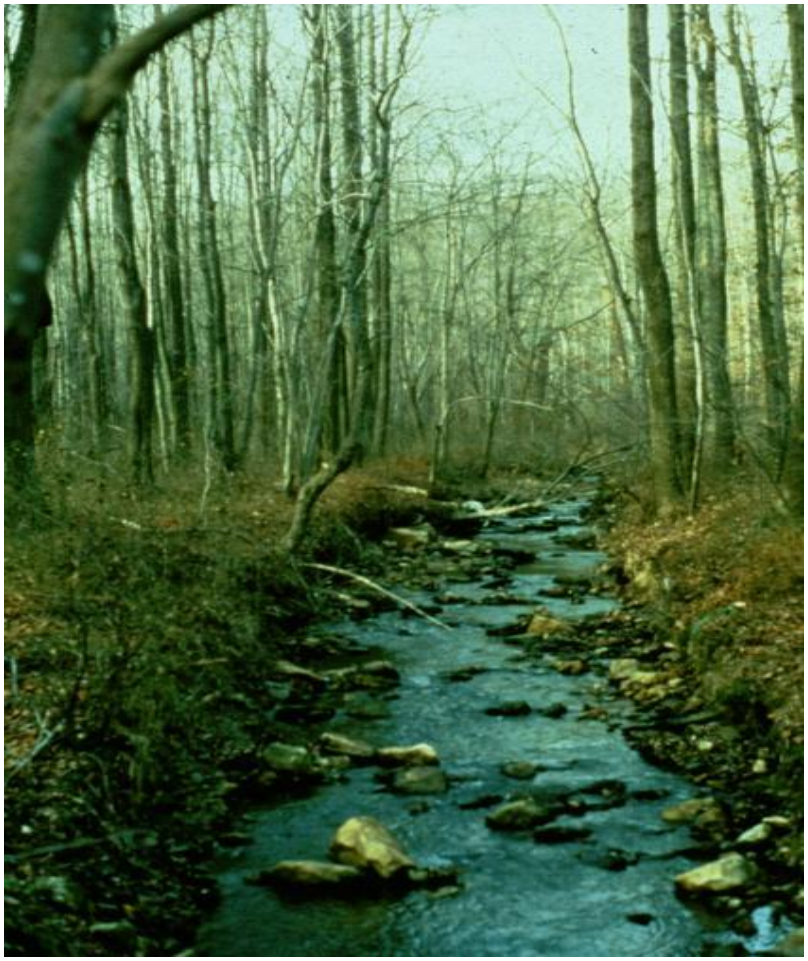
Streams, wetlands, floodplains, hydric soils and forests all run together in the valley bottom



Environmental Impacts and Co-benefits of SRP

- Most contentious issue(s) in the approval of all 5 group memos
- More than 30 new studies on nutrient dynamics/environmental response of SRPs
- Group heard more than a dozen research presentations on impacts
- Comprehensive review of stream restoration impacts (Appendix F)
- Guidance on best practices to minimize them (input from multiple agencies)
- States/EPA always reserve regulatory authority on permit conditions/denials

Post-Restoration Floodplain Ecosystem Targets



Unintended Environmental Consequences of Stream Restoration Practices

Project Stream Channel

- Depleted Dissolved Oxygen
- Iron Flocculation
- Warmer Summer Stream Temperatures
- More Instream Primary Production
- Turbidity During Project Construction
- Initial Decline in Benthic IBI

Floodplain/Downstream

- Project Tree Removal
- Post Project Tree Loss
- Vector for Invasive Plant Species
- Shift in Wetland Type/Functions
- Increased Flooding
- Initial Decline in Downstream IBI
- Upstream Blockage for Aquatic Life

General Notes on Impacts

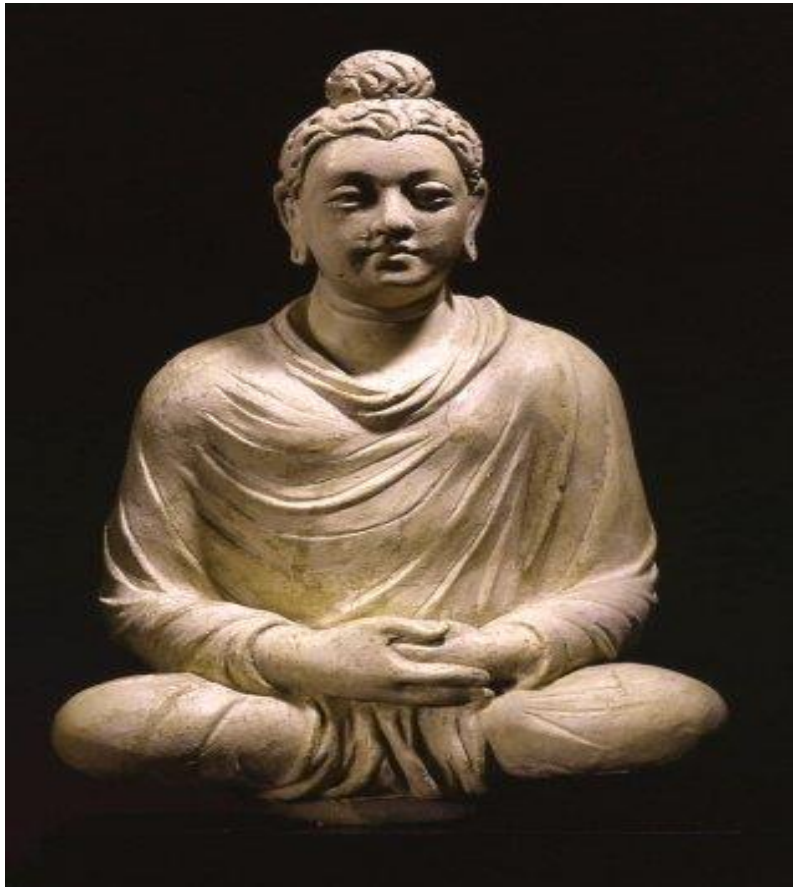
- Impacts need to be considered in relation to the stressors measured in a comparable unrestored urban stream/floodplain system
- Short-term adverse impacts are common during and shortly after construction, followed by project adjustment and recovery over several years

Severity of impacts is related to:

- Inadequate project assessment
- Site-specific factors
- Exposure to extreme flows
- Care taken in project location, design and construction
- Use of specific best practices to minimize impacts

Meditation Break

To energize us to power thru a monotonous series of boring word slides to come



25 Best Practices for TMDL Stream Restoration Projects *

- Choosing the Right Stream Restoration Projects
- Project Design Principles
- Good Construction Practices
- Post-Construction Practice for Inspecting, Verifying and Maintaining Projects

* Consider this as very draft, experts are still working out the exact prescriptive language

Best Practices During Project Assessment and Design -- I

- Projects should identify and remedy the source(s) of impairment for the stream and its floodplain
- Avoid restoration projects at sites:
  - where aquatic diversity metrics indicate that the stream is currently in good or excellent condition.
  - floodplain or wetland metrics indicate that the floodplain plant community is functioning well.
- Existing forests should be carefully surveyed to minimize tree clearing during construction
- Existing habitat functions should be assessed prior to design.
- More intensive surveys are needed if high quality stream or wetland resources are suspected to be present within or below the project reach

Best Practices During Project Assessment and Design -- II

- Special consideration should be given to protecting freshwater mussels and their host fish
- All constructed instream structures should be carefully analyzed to ensure that fish, eels and other aquatic life can safely pass
- Avoid creating stagnant pools within the stream channel, although it is fine to create vernal pools within the floodplain as habitat features.
- Avoid designs that utilize extensive bank armoring using rock or other fixed structures, and respect the max armoring limits adopted by Group 3

Best Practices for Project Assessment and Design- III

- Avoid designs that create long-term inundation or pooling over the surface of the floodplain
- H&H modeling should be performed to define how the proposed project will affect local and downstream elevations of the 100-year floodplain, and conform to federal and state floodplain management requirements
- Soil investigations for potential toxics contamination at some highly urban and/or brown-field floodplain sites
- Limit disturbance of any acidic soils present at the project site.

Best Practices During Project Construction - I

- Reduce the use of “iron-stone” rock or sand and other iron-rich construction materials when raising the streambed.
- Decrease the use of labile organic matter added to the stream bed (e.g., compost)
- Minimize removal of mature trees in the existing riparian zone, as specified in the project’s forest conservation plan

Best Practices During Project Construction -II

- Minimize disturbance caused by construction access and use appropriate equipment to reduce compaction of the stream's bed, banks and floodplain

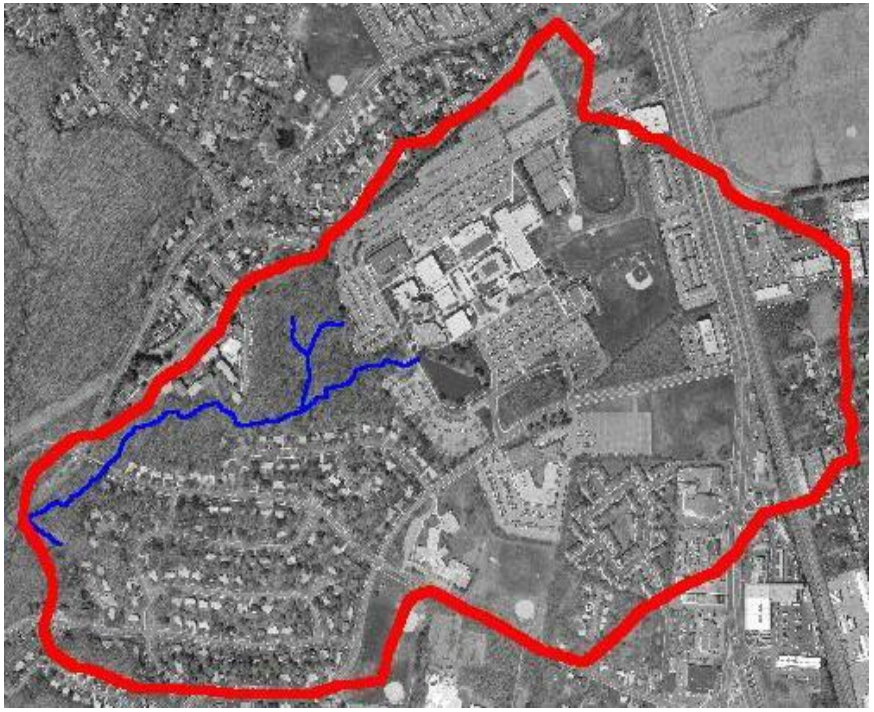
- Work "in the dry" during project construction to reduce potential for downstream bed sedimentation or turbid discharges

- Recycle wood from any trees cleared during construction to create woody features within the restoration project site

Best Practices for Post-Construction Phase

- Verify that individual projects continue to meet their functional performance objectives
- Use Group 1 methods to assess hyporheic exchange and floodplain reconnection functions every 5 years after permit expires
- Focus on indicators for project failure that focus on maintaining:
  - Pre-restoration baseflow conditions in the stream channel
  - Intended bank heights along reach to support floodplain reconnection
  - Desired density/species targets for the restored floodplain plant community
- Implement an invasive species management plan to maintain the post-restoration vegetation target for the project
- Adjust structures to lower water elevation if they are responsible for unacceptable inundation or pooling over the surface of the floodplain

Upland Alternatives to Stream Restoration

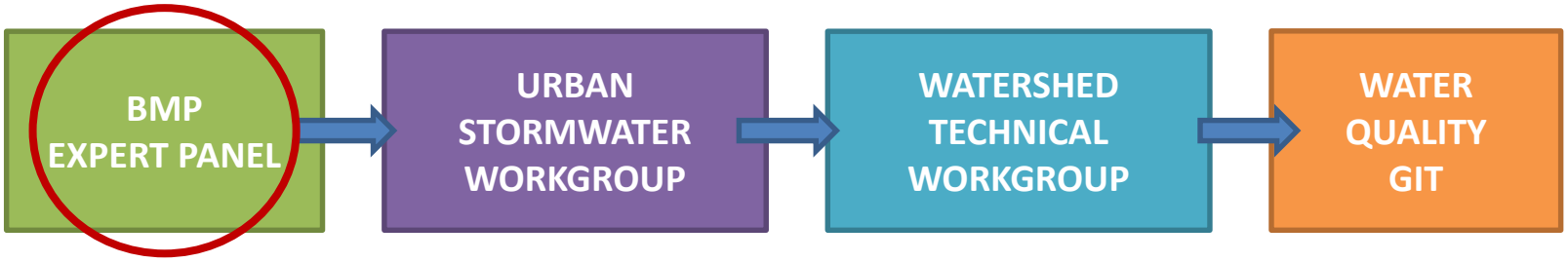


Ideal pathway for going forward next 120 days

Chesapeake Bay Program
A Watershed Partnership

- Present Group 4/5 Memos to USWG in May
- 30-45 Day External Comment Period
- Summer CBPO Approval

- WQ and Habitat groups develop long-term workplan on priority research on effect of best practices for restoration practices



Questions and Answers

Get current at: www.chesapeakestormwater.net