

SESWA 2018

Getting Our Feet Wet at Every Stage: Optimizing the Restoration of Urban Streams

October 4, 2018



Presentation Outline

Planning/Design – challenges, approaches, optimization

Public Outreach/Stakeholder Involvement – tips to get it right

Permitting - considerations

Construction – how to avoid the pitfalls





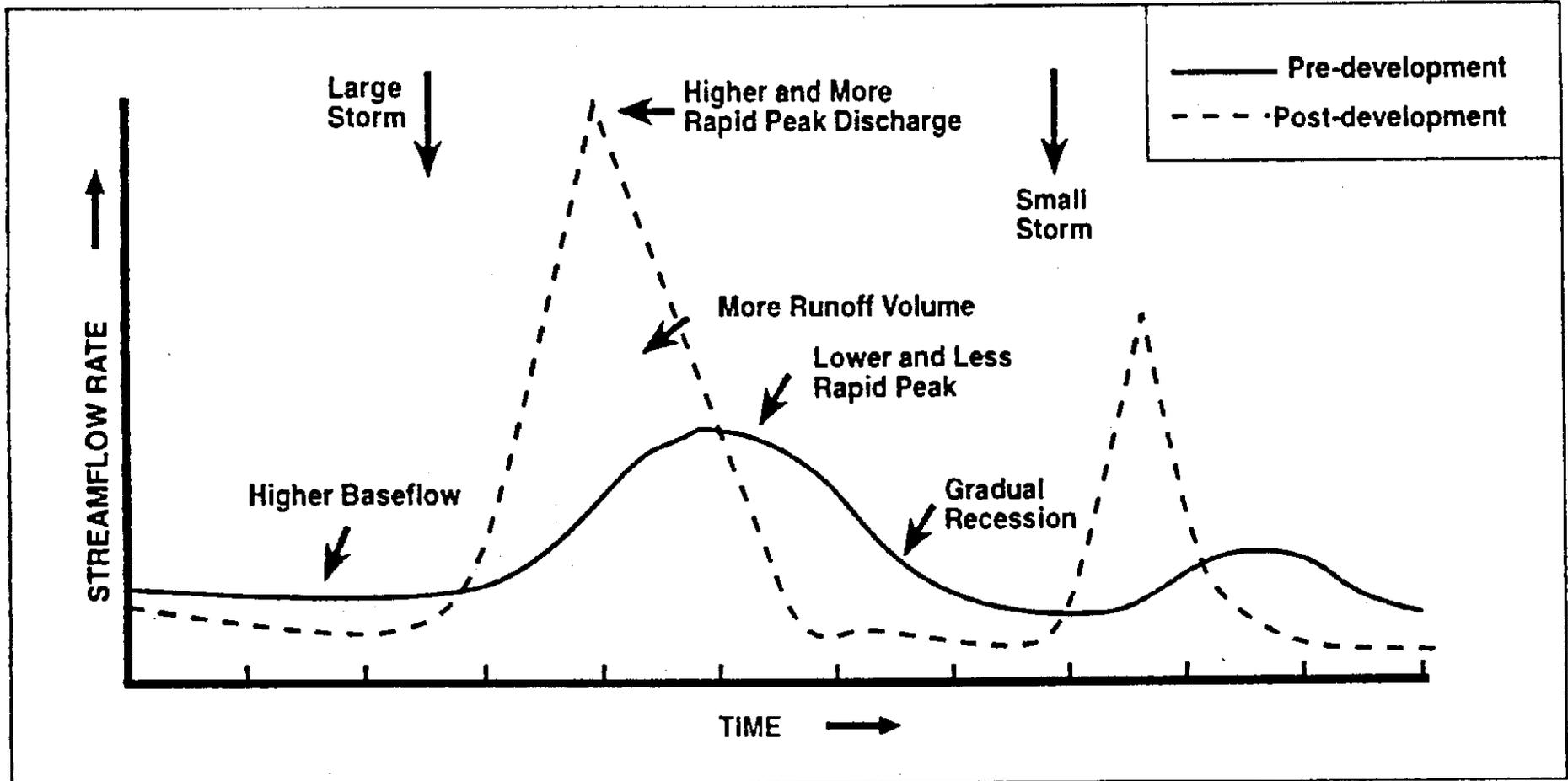
Optimizing the Restoration of Urban Streams
Planning and Design

Identify Stream Problems



Development Impacts on Streams

STREAMFLOW



Results in Unstable Channel



Increase in TSS and Turbidity;
Impacts Macroinvertebrates
and Entire Stream Ecology

Loss of Property \$\$\$
Exposes Sanitary Sewers
Can Result in SSOs



Results in Sediment Deposition

- Channel Blockage
- Continuing Maintenance \$\$
- Upstream Flooding
- Loss of Property \$\$\$\$



Results in Impairments

- TSS – Biota
- Fisheries
- Nutrients – N and P
- Pathogens



In natural condition, streams attenuate pollutants. Decrease in residence time and loss of habitat reduces natural physical and biological processes.

Know Your Project Challenges/Issues

- Location – park, public area, private property
 - Safety
 - Maintain use of adjacent areas
 - Is tree removal an issue?
- Urban Environment
 - Utilities
 - Culvert alignments
 - Construction vehicle access/impacts
 - Noise impacts



Know Your Project Challenges/Issues

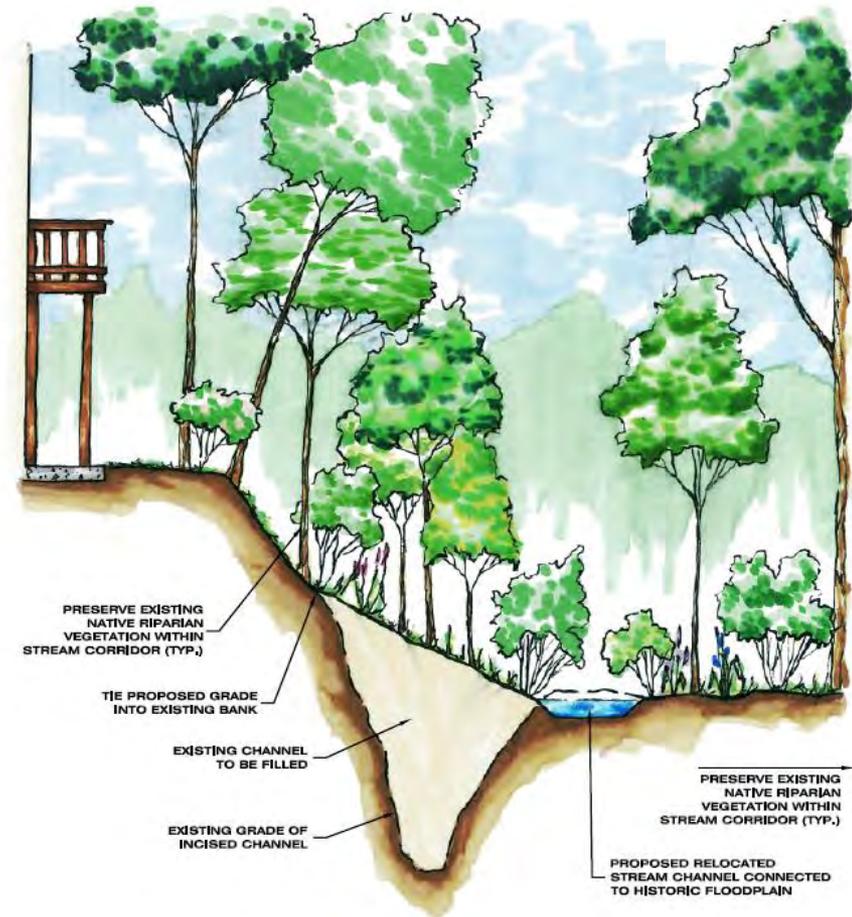
- Constraints

- upstream or downstream constraints
- Dams/tailwater issues
- Historic changes in the watershed



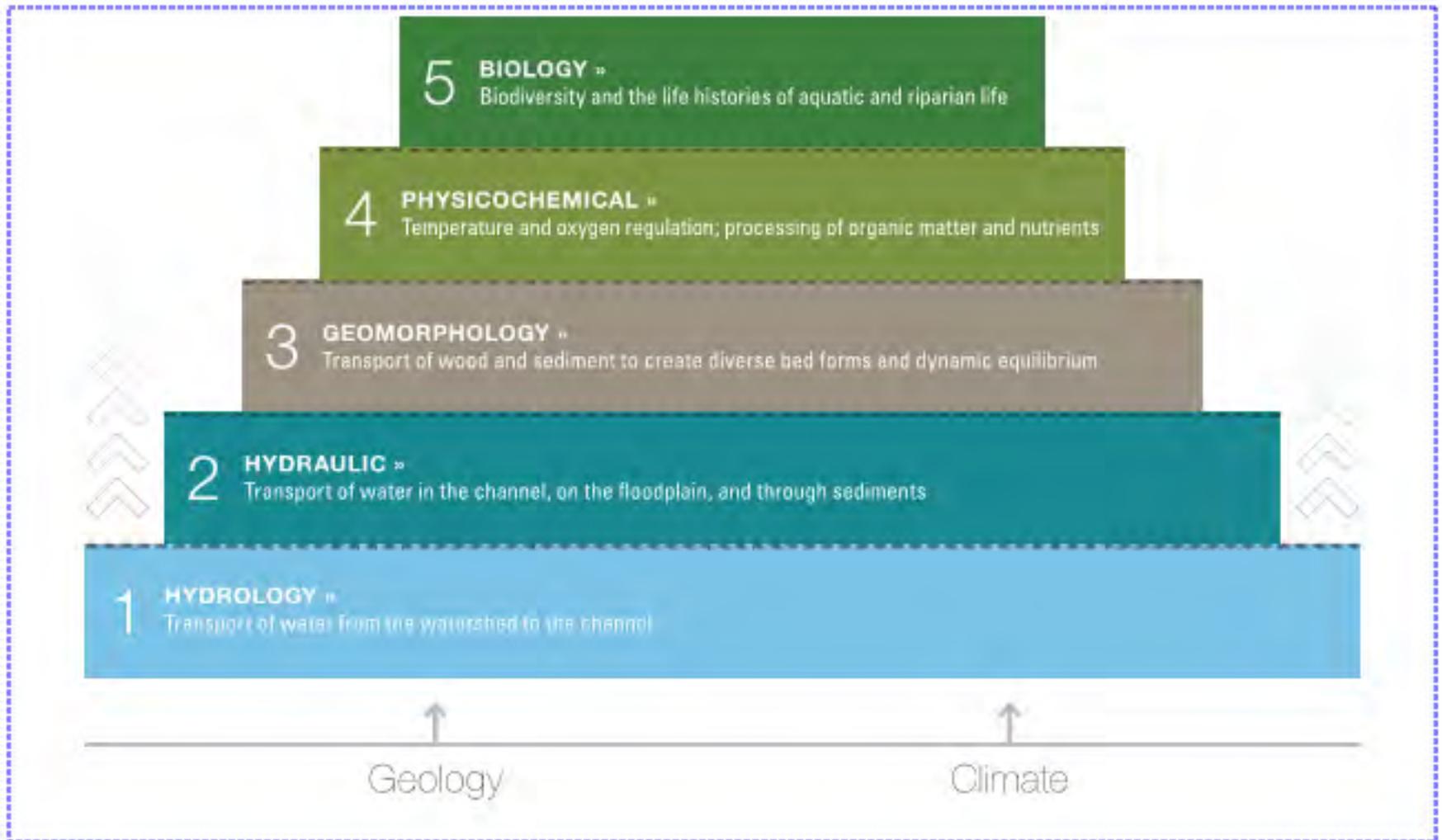
What are your Project Goals?

- Stabilize stream banks to reduce water quality impacts
- Reduce impacts to downstream aquatic resources
- Protect adjacent infrastructure
- Provide enhanced recreational opportunities
- Provide an educational opportunity



Set goals that relate to solving a functional problem

Stream Functions Pyramid



Source: Harman, W., R. Starr, M. Carter, K. Tweedy, M. Clemmons, K. Suggs, C. Miller. 2012. A Function-Based Framework for Stream Assessment and Restoration Projects. US Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Washington, DC EPA 843-K-12-006.

Pre-construction Monitoring

- Visual inspection – Establish GPS-based photo benchmarks
- Geomorphic measurements
- Sediment accumulation
- TSS Loading estimation
- Bank Erosion
- Pebble count
- Macroinvertebrate sampling
- Benthic Macroinvertebrate Collection and Assessment
- Water Quality Sampling



Know your Restoration Approach

- Natural Channel Design
 - Stable dimension, pattern and profile
 - Not aggrading or degrading
 - Bankfull channel



Know your Restoration Approach

- Valley Restoration

- Small channel
- Minimal sediment transport
- Encourage groundwater/surface water interaction
- Pre-disturbed conditions



Know your Restoration Approach

- Re-generative Design

- Often considered a BMP
- Step Pool Stormwater Conveyance (SPSC)
- Ephemeral Channels - Regenerative Stormwater Conveyance (RSC)

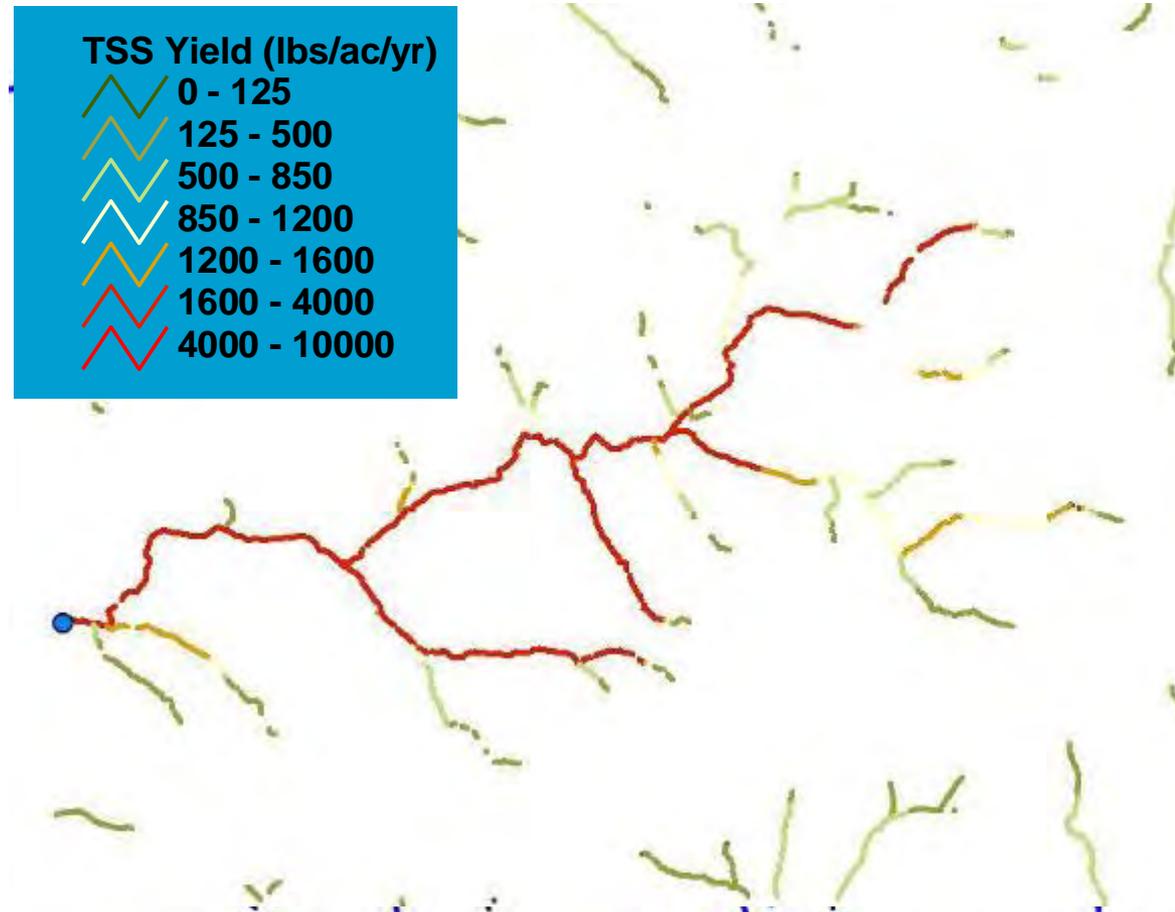
- Others

- Large Woody Debris
- Dam Removal



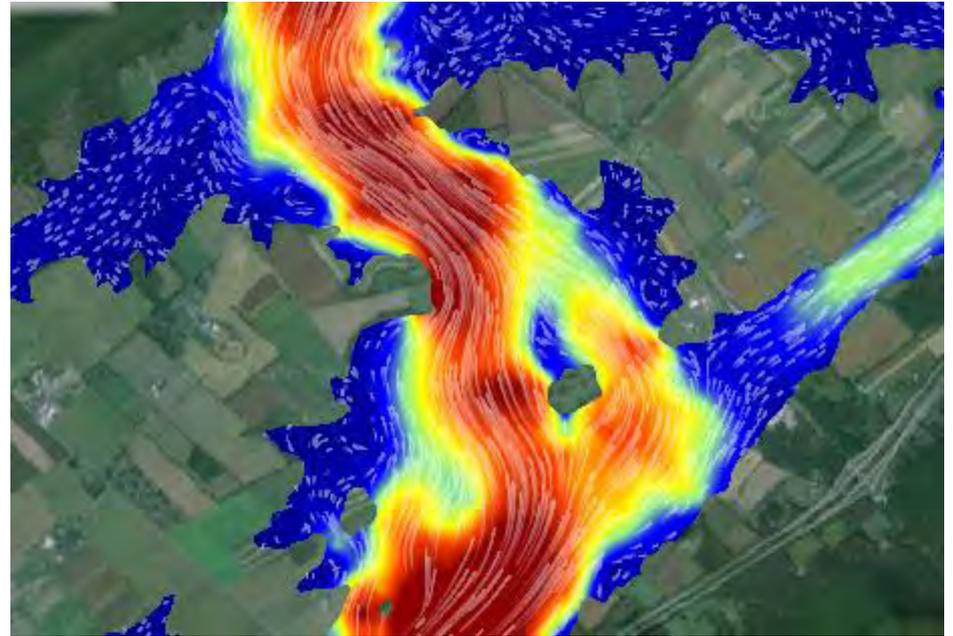
Modeling to Evaluate Current and Future Conditions

- Use DEM to determine:
 - Flow direction
 - Drainage area
- Streams Segments
- Stream walk data
 - Bank cover
 - Bank height
 - Segment length
- Land Cover
- TSS Yield



Modeling to Evaluate Current and Future Conditions

- Hydrology and Hydraulics
 - Flows
 - Velocities
 - Sheer Stress
- Sediment Supply and Transport
 - Suspended sediment
 - Bedload





Optimizing the Restoration of Urban Streams
**Public Outreach/Stakeholder
Involvement**

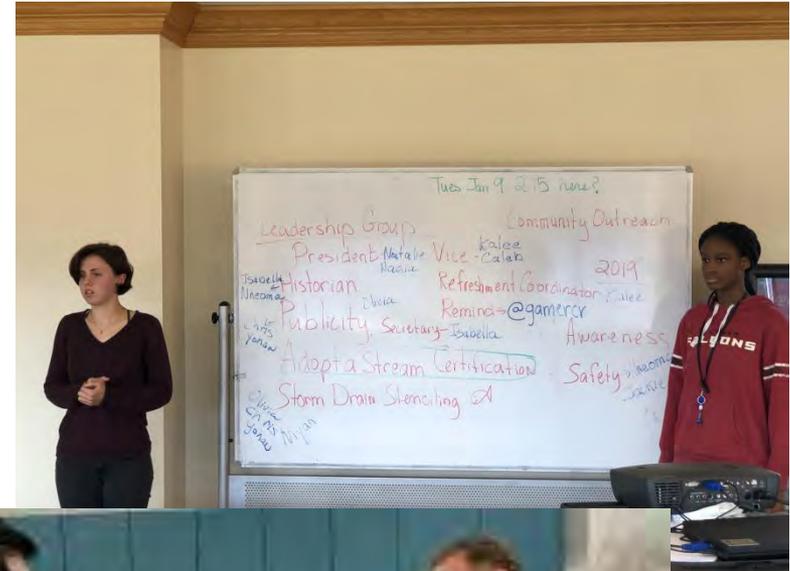
Lessons Learned

- Stakeholder Engagement is Important
 - Include all Stakeholders – Schools, neighborhood associations, public, other groups
 - Early – Conceptual Design (or even before in some cases)
 - Frequently – Monthly/quarterly
 - Information at the level of your audience



Public Communications

- Public Meeting prior to construction
 - Overview
 - Existing Conditions
 - Project Improvements
 - What to Expect
 - Schedule



Public Communications

- Project Signs
 - Visible Location
 - Project Aspects
 - Benefits
 - Pictures





Optimizing the Restoration of Urban Streams
Permitting

Permits May be Required From:

- U.S. Army Corps of Engineers (ACOE) –
Nationwide 3, 27, others
- U.S. Fish and Wildlife Service
- State
 - Water Quality
 - Historic Preservation Division
 - Erosion Control
 - Other
- Local governments (Cities, Counties)

Keys to a Successful Submittal

- Know what permits are needed
 - State and Local
 - Federal
- Communication
 - Verbally
 - Often
 - Client-Consultant-Reviewer



Keys to a Successful Submittal (cont.)



- Relationships
 - State and Local Agencies
 - USACE
- Know your reviewers and their limitations
 - Know and understand the regulations
 - Understand what things they may or may not have any leeway on

Keys to a Successful Submittal (cont.)

- Unique issues about your site/project
 - Location
 - Social Issues
 - Environmental Issues
 - Site Conditions
- Develop project alternatives (if needed) early
 - Feature locations
 - Size
 - Avoid, Minimize, Mitigate





Optimizing the Restoration of Urban Streams
Construction

Construction



Construction



Construction



Questions?

