

Stream Project Implementation Issues



Stream Restoration Design, Assessment, Permitting & Construction



Ecological Restoration
Innovative Stormwater Management
Water Resources Engineering
Environmental Assessments
Environmental Permitting
Ecological Monitoring
Agricultural Consulting

**ECOSYSTEM
SERVICES**



Successful Stream Restoration

- Attains Goals
- Restores Physical & Ecological Functions
- Self-sustaining
- Serves as a Model for Future Projects



Goals of Restoration Projects

Enhance Functions of Natural Systems

- Physical: Hydrologic & Geologic
- Chemical: Water Quality Improvement
- Biological: Habitat (optimal & diverse)
- Society Value: Recreation & Aesthetics



Stream Restoration Design Methodologies

- Natural Channel Design
- Stream Stabilization (NRCS)
- Allowable Velocity/Shear Stress
- Flow Regime
- Target Species (DGIF)
- Analytical Method (USACE)
- Sediment Transport
- Pre-Settlement Restoration or Valley Restoration



Natural Channel Design

What?

Designing streams to mimic stable channels in undisturbed, “natural” settings. Using analog, empirical and analytical methodologies.

Why?

Restore stream functions including physical, biological, and chemical processes. Natural stable channels are self-maintaining.



Natural Channel Design Philosophy

- Look for converging lines of evidence from multiple methodologies to reduce the error of any one.
- Use judgment in weighting each method based on the data available and the applicability of the methodology to the particular project reach.
- Streams are dynamic systems that need to be designed for adjustment – don't be rigid.



Natural Channel Design Process

- Define the Expected Project Goals
- **Research**
- **Data Collection/Assessment**
- **Stability Analysis (Symptoms)**
- **Redefine Project Goals (Diagnosis)**
- **Reference Reach Survey**
- Conceptual Design
- Permitting
- Analysis (Treatment)
- Final Design (Prescription)
- Construction (Surgery)
- **500 year Storm Event**
- Monitoring (Monitoring)
- **Adaptive Management**

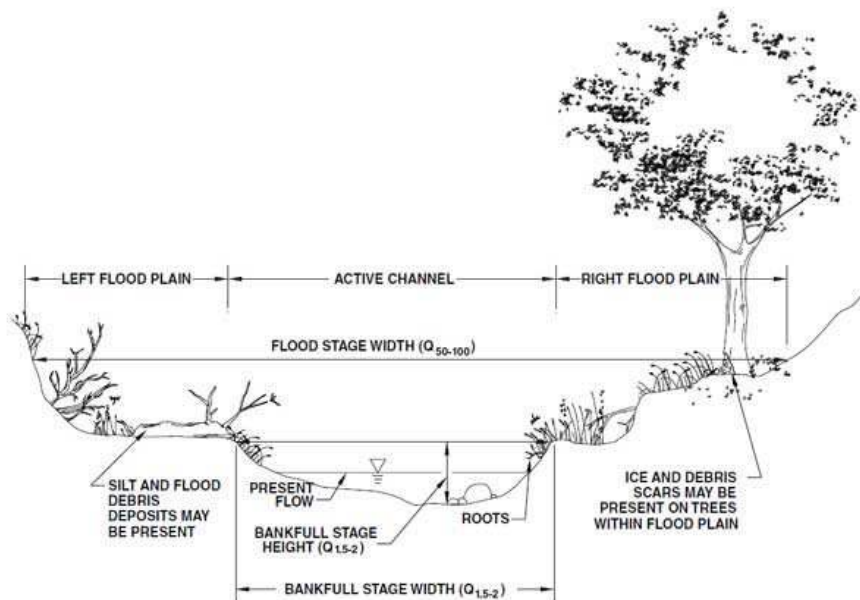


Bankfull Identification

Bankfull stage is the elevation at which flow transitions from the channel to the floodplain otherwise known as the **point of incipient flooding**. It is also used to describe the effective or dominant discharge which corresponds to the **cumulative erosional and depositional effects of stream flow over time**.

Bankfull characteristics should be distinct and consistent throughout the stream reach.

- A discrete transition from sloped channel bank to flat floodplain
- Flat depositional bench
- High Scour Line
- Horizontal Point Bar
- Mid-channel Bar



What variables affect channel morphology?

- Flow (frequency, duration, and intensity)
- Sediment Load
- Bed Material
- Bank Material
- Vegetation/Roughness
- Valley Slope
- Wildlife?

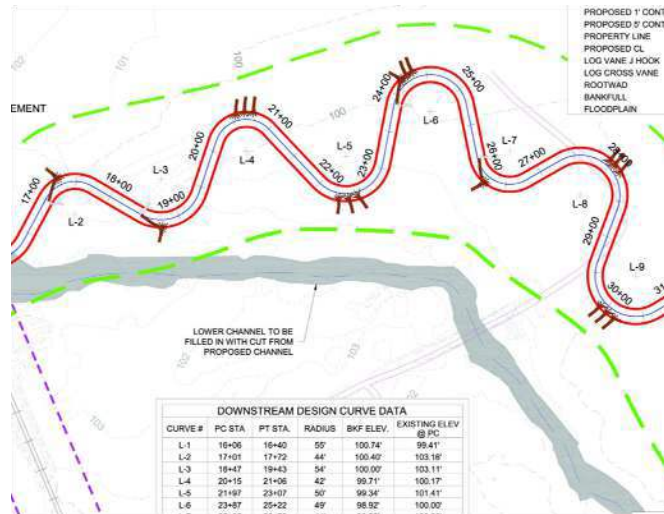


Wikipedia



Stable Stream – Reference Reach

Conceptual Restoration Plan



Environmental Regulatory Overview

- 404 and 401 Clean Water Act
- TMDLs
- Chesapeake Bay Preservation Act
- Virginia Stormwater Management Act
- FEMA Regulations



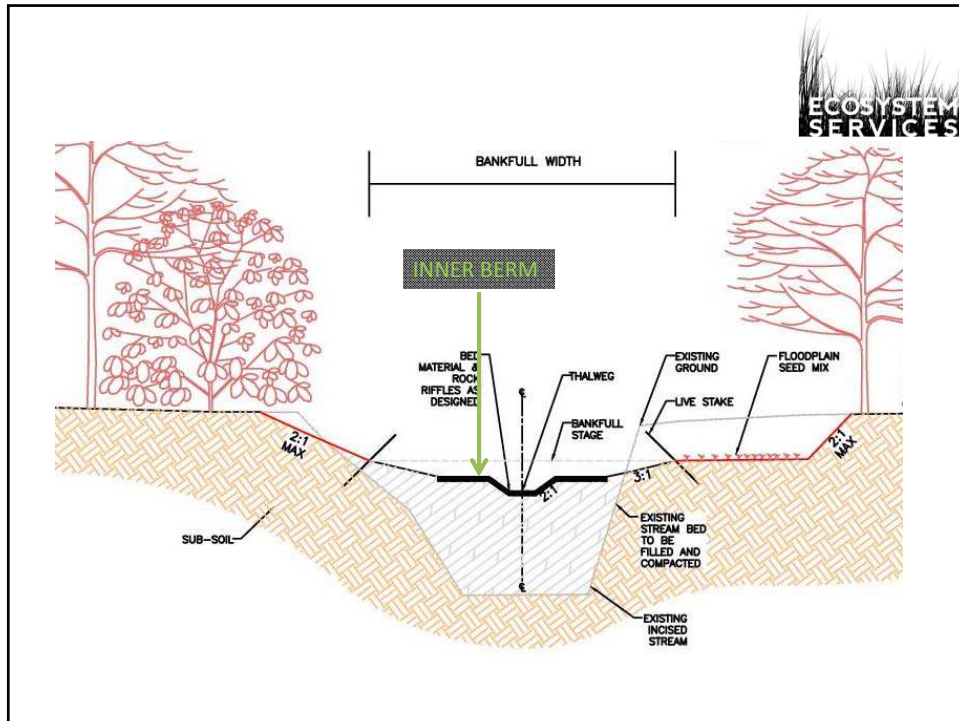
404 & 401 Permitting Time Line

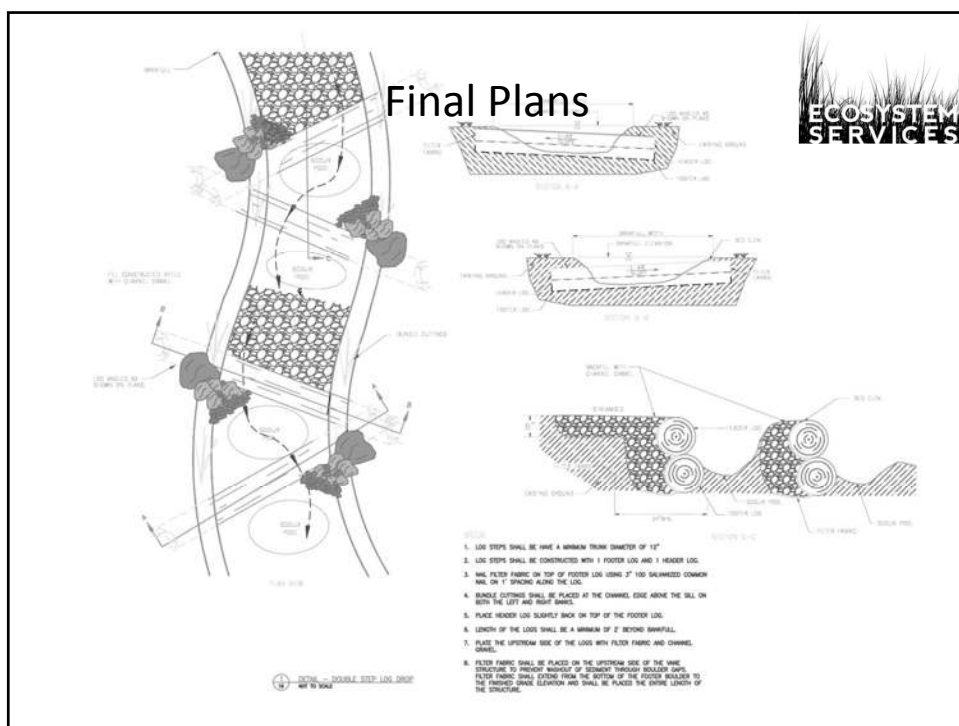
- Delineation of aquatic resources (varies)
- Submission of a Preliminary Jurisdictional Determination (PJD) to the Army Corps of Engineers (10 days to assign ACOE Rep.)
- Joint Permit Application of Impacts (45 day review time)
 - Must show avoidance and minimization
 - Must provide mitigation if over applicable thresholds (typically 300 linear feet or 1/10th of an acre) or functional quality deemed significant
 - T&E Species & Section 106 Coordination
- Pre-construction Notification with ACOE and DEQ (if required)
- Public Notice Period (if required)(30 days)
- Other issues that can arise with the permitting process are historic resources and endangered species. This can delay a process considerably.
- Permitting an impact can take approximately 90 days or 3 months
- **Individual Permits can take up to 180 days.**



Developing a Restoration Planting Plan

- Site Assessment
- Identify Reference Habitats
- Identify Climax Plant Community
- Identify Restoration Goals
- Develop Plant List





Construction & Implementation



Construction

- Erosion and Sediment Control
- Work from upstream to downstream
- Test structures after construction
- Stabilize at the end of each day
- Planting during the dormant season

Install E&S Measures as 1st Step



Use Trained & Experienced Contractor



Be picky about the plants and how and when they are planted



Final Stabilization is Critical!





Why Do Projects Fail?



Faulty Design





