Outline

• Introduction

• Background
  • Location
  • Define the Problem
  • History
  • Alternative Analysis

• Floodplain Bench Project
  • Permitting Requirements
  • Design
  • Construction
Define the Problem

• Extremely flat topography
• Less than 25 feet of elevation drop in the main channel through the 12.5 mile Black Dirt region ($s_{ave} = 0.0004$ ft/ft)
• Farm fields supply produce to NYC
• Minimize time lost on fields
Define the Problem
History

• Black Dirt
  • What is it?
  • Why is it significant?
• Drainage District
• 1930’s ACoE Project
• 1980’s ACoE Project
History

• Orange County Soil and Water Conservation District obtained grant to address flooding after Irene

• Created Committee of local farmers to assist in administering

• Alternative Analysis

• Implementation of Priority Projects
Alternative Analysis

• Comprehensive Hydraulic Model
  • Hydrology
  • HEC-RAS Model
• Series of Stakeholder Meetings
• 20+ Alternatives evaluated
• Priority Projects
Hydrology

- Gage Station Data
  - Wallkill River near Pellets Island Road
  - Pochuck Creek near Newport Bridge Road
  - Rutgers Creek near Carter Road
  - Quaker Creek in Florida, NY
- Log Pearson Type III Frequency Analysis
- Hydrographs
<table>
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<tr>
<th>Event</th>
<th>Wallkill River</th>
<th>Pochuck Creek</th>
<th>Quaker Creek</th>
<th>Rutgers Creek</th>
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2 YEAR HYDROGRAPH

Flow (cfs)

Time (hours)

Quaker Creek
Rutgers Creek
Pochuck Creek
Wallkill River
Hydraulic Model

- HEC-RAS Model
- LiDAR
- Field Verification
- Unsteady State
• Objective:
  Add conveyance while restoring and preserving the natural character of the stream.
Floodplain Bench Project

- Typical Section
Permitting

- Habitat Requirements
  - Phase the project to reduce temporary impacts
  - Tree Cutting Restrictions
- Flood Control Permit
- Modification of DEC Easement
- Landowner Agreements
Design

- Planting Plan
- B&B Trees
- Container Trees
- Live Stakes
- Wetland Seed Mix
• Benefits
  • Reduce magnitude of flooding upstream
  • Reduce duration of flooding upstream (particularly smaller events)
  • Increased habitat along river
  • Increased Riparian Buffer
Phase 1 - Tree cutting
Phase 1 - Tree cutting
Phase 1 – Soil Removal
Phase 1 – Soil Removal
Phase 1 – Challenging Conditions
Phase 1 – GPS Grading
Phase 1 – Soil Placed on Adjacent Field
Phase 1 – Soil Placed on Adjacent Field
Phase 1 – Soil Removal
Phase 1 – Access Road Maintenance
Phase 1 – Access Road Maintenance
Phase 1 – Access Road Maintenance
Phase 1 – Soil Segregation
Phase 1 – Salvaged Some Trees
Phase 1 – Wet Conditions
Phase 1 – Planting
Phase 2 – Soil Removal
Phase 2 – Soil Removal
Phase 2 – Soil Removal
Phase 2 – Erosion Control
Phase 2 – Staked Trees
Phase 2 – Completed Bench
Phase 2 – Completed Bench
Phase 2 – Completed Bench
Phase 2 – Completed Bench
Phase 2 – Completed Bench
Phase 2 – Completed Bench

Project Fully flooded on 1/12/18
Phase 2 – Completed Bench

Project Fully flooded on 1/12/18
Phase 2 – Completed Bench

• Phase 1 Complete in 2017 ($1,200,000)
• Phase 2A Complete in 2018 ($210,000)
• Phase 2B Completed in 2019 ($260,000)
• Phase 3 to be Completed in 2020?
The experience to listen
The power to solve℠