






Wilmes Lake Ravine Restoration Project

Presented by
the
City of Woodbury
& WSB & Associates, Inc.






Project Location






Watershed Information

- Watershed Area: 765 acres
- Mixed land use including
 - Single and multi-family
 - Commercial
 - Institutional
 - Open and park space
 - Wetlands






Ravine Information

- 100 year flow: 250 cfs
- 10 year flow: 110 cfs
- Trail washed out in large rain events in 2005
- Length: 1,570 feet
- Average percent of grade: 2.4% or greater
- Elevation change: 37 feet
- Trail crossings
- Varying channel width
- Heavily used recreational area






Pre-Construction Condition

- Completely unstable channel with severely eroded slopes that were nearly vertical
- Confined channel area
- Heavy tree canopy
- Difficult access
- Varying flow conditions



Pre-Construction Condition

- Pollutant loading from the eroding ravine
 - 190 tons per year of sediment
 - 190 pounds per year of Phosphorus





Project Objectives


- Provide solutions for the following:
 - Stabilize the existing channel to handle flows up to 250 cfs
 - Significantly reduce erosion within the channel
 - Improving water quality within Wilmes Lake
 - Improve natural esthetics within the ravine

Preliminary Design Alternatives

- Investigation of improvement options:
 - Resizing of existing culverts
 - Realignment of existing ravine
 - Provide high flow bypass pipe
 - Provide options for stabilizing ravine
 - Provide upstream improvements
 - Included as part of the project

Selected Design

- Install 42 inch HDPE bypass pipe within ravine to handle higher flows
 - Lighter material allows for reduced impact during construction
 - Use of HDPE pipe, manholes, and bends allows for further flexibility during construction for optimal alignment
 - Install Tee section manhole to provide high flow bypass and for base flow within the channel

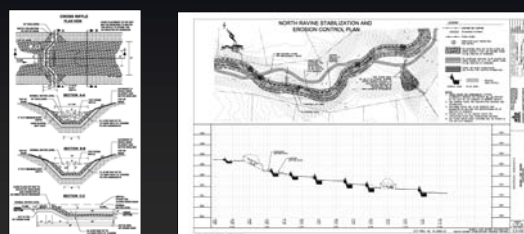


Selected Design

- Reconstruct ravine
 - Realign channel to reduce potential for erosion
 - Stabilize ravine slopes with class III fieldstone rip rap
 - Install 22 drop structures to compensate for the 37 feet of relief within channel
 - Install inlets upstream of existing culverts to prevent trail washout
- This option provided the most cost-effective, long term stabilization alternative and would allow for the complete restoration of the ravine.



Selected Design

Ravine and Drop Structure Detail



Project Strategy

- **Typical cross sectional design**
 - Minimal fieldwork completed for design
- **Designed to be a field fit project**
 - Plans and specifications allowed for flexibility in the field
- **Project continuity**
 - Small project team
 - Design engineer/construction management
- **Reduce risk for Client and Contractor**
 - Control of project schedule
 - Estimated quantities
 - Field measurements



Construction

Construction began winter 2010




Trees were selectively cut by hand and hauled out on the existing bituminous path to reduce the impact to the channel.



Construction

HDPE pipe was installed



Construction

Reconstruction of the channel followed after the pipe installation






Construction

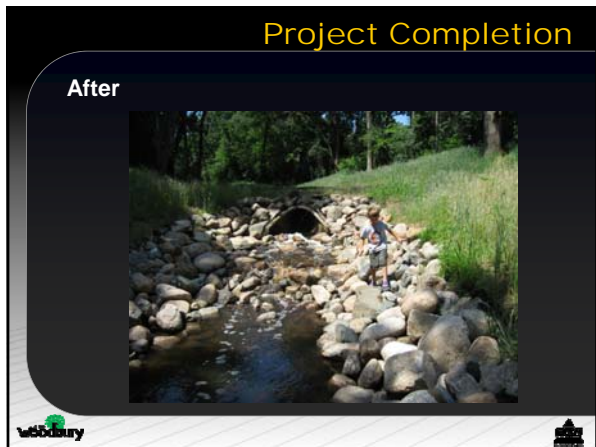
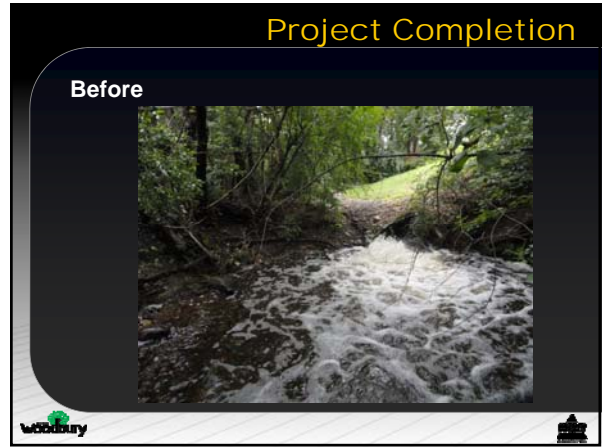
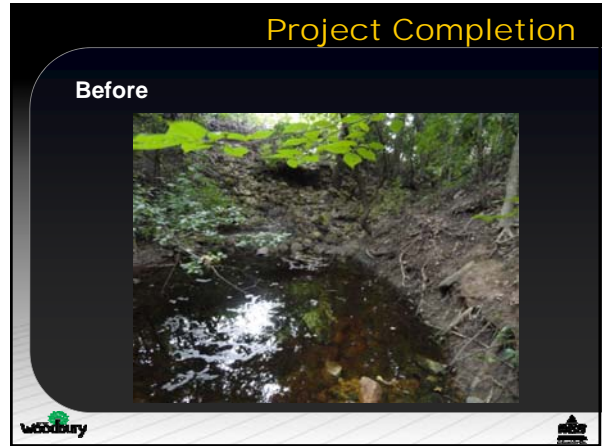
Installation of drop structures

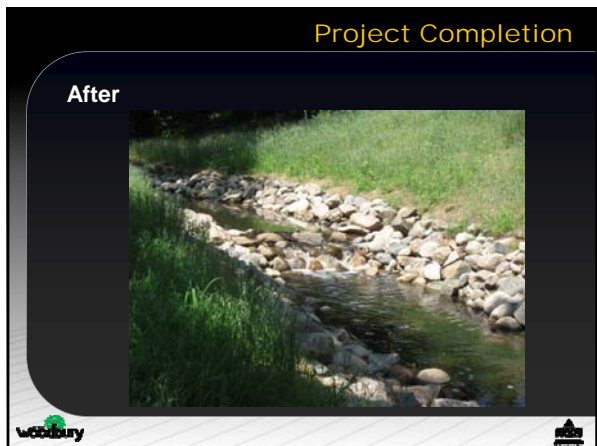


Project Completion

Storm sewer T-section manhole







- Project Closeout
- The project was accepted by the City of Woodbury in 2011.
 - Total project cost was 5% below the estimated project cost of \$560,000
 - Project included complete replacement of the North Ravine Trail, which was outside of the original scope of the project
- woodbury
- msa
- This slide provides project closeout details. It lists three key points: the project's acceptance by the City of Woodbury in 2011, the fact that the total cost was 5% below the estimated \$560,000, and that the project included the replacement of the North Ravine Trail, which was an additional scope item.