



Green Infrastructure & Stormwater Management CASE STUDY

Terraced Reforestation

Location: Interstate 75 Corridor,
Covington, KY

Client: Northern KY Sanitation
District No 1

Design Firm(s): Human Nature
Inc., Strand Associates, Riegler
Engineering, Thelen Asssoc,

**Landscape architect/Project
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ASLA Chapter: Kentucky



Project Specifications

Project Description: The watershed for the project is in a Combined Sewer Area of the City. Combined Sewers get surcharged by stormwater and overflow into the Ohio River. The U.S. EPA requires communities to control these overflows. This project intercepts run off the the adjacent watershed and passes it through a series of constructed biofiltration trenches and berms. Stormwater is briefly ponded on the surface, then filters through a sand based soil medium. The underdrain stores and slowly releases flow to the next berm. The 12 berms, almost 1 mile in total length, are connected in series for maximum treatment train, leading to reductions in run off and improved water quality. The biofiltration trenches are planted with native trees, and seeded with native grass and forbs. Over 280 trees are planted with the intent of establishing complete canopy coverage of the site.

Project Type:

Transportation corridor/streetscape
A retrofit of an existing property

Design features: Bioretention facility - reforestation was integrated into the bioretention/infiltration trenches.

This project was designed to meet the following specific requirements or mandates:

Federal Clean Water Act

Impervious area managed: 1 acre to 5 acres

Amount of existing green space/open space conserved or preserved for managing stormwater on site: greater than 5 acres. This highway right of way was a steep slope, with very poor soil conditions that would not support meaningful vegetation. This project restores and enhances the site ecological function in a very highly visible corridor with 150,000 vehicles per day.

The regulatory environment and regulator was supportive of the project.

Did the client request that other factors be considered, such as energy savings, usable green space, or property value enhancements? Yes, the high visibility of the site led to its selection as well as long term energy savings by reducing stormwater from entering the sewer system and being treated.

Cost & Jobs Analysis

Estimated Cost of Stormwater Project: \$500,000-\$1,000,000 (Public funding: Federal, Regional)

Was a green vs. grey cost analysis performed? Yes. This project was modeled both for its stormwater run off reduction as well as its direct reduction in Combined Sewer Overflow (CSO) from the downstream sewer system. Through SWM modelling the project shows a reduction in CSO's by 3.1 million gallons in a typical year. Alternative grey controls proposed for this area include underground storage tanks and/or deep combined sewer tunnels. The project proved to be on par with grey from a cost stand point but ranked much higher with ecological benefits and social benefits. The 3.1 MG removed annual also precludes that combined sewage from being treated in the future leading to further saving in energy and resources.

Cost impact of conserving green/open space to the overall costs of the site

design/development project: The site was excess Interstate right of way that consisted of heavy compacted clay, steep slope, and very little infiltration with rapid run off. The existing site did not support meaningful vegetation. There were significant costs in constructing a system of linear biofiltration trenches, to provide the infiltration, treatment and conditions for successful establishment of trees.

Cost impact of conserving green/open space for stormwater management over traditional site design/site development approaches (grey infrastructure)? Slightly reduced costs (1-9% savings). Initial costs were on par with or slightly lower, but long term will yield a savings year after year over a traditional grey control.

Number of jobs created: 6-10 construction related jobs

Job hours devoted to project: Not available

Planning and Design: Not available

Construction: Not available

Annual Maintenance: Not available

Performance Measures

Stormwater reduction performance analysis:

The modeled results show a 25 - 30% reduction in stormwater runoff. With the reduction in runoff and the detention functions of the the design lead to a modeled reduction of 3.1 million gallons of combined sewer overflows in a typical year.

Community & economic benefits that have resulted from the project: The site is a gateway corridor into the City of Cincinnati and the Ohio River Valley

Additional Information

Links to images:

http://www.sd1.org/resources/Terraced_Reforestation_Project_Fact_Sheet_Updated.pdf