Striving for a Resilient Future
Through High Performance Landscapes

January 30, 2015 | 14th Annual New Partners for Smart Growth Conference | Baltimore, Maryland

Photo by Denmarsh Photography, Inc.
LEARNING OBJECTIVES

- Learn about completed projects where landscapes were considered and which resulted in healthier urban environments and communities.

- Identify tools for supporting and measuring the performance of sustainable land design and development.

- Learn how standards and certification systems provide a framework for the design and development of healthier, more resilient communities.

- Learn about opportunities to increase beneficial ecosystem services provided by a site.
Encouraging and Rewarding Leadership in Site Sustainability

Danielle Pieranunzi
SITES Program Director
Lady Bird Johnson Wildflower Center
University of Texas at Austin
An interdisciplinary effort to develop guidelines and a voluntary rating system for sustainable land design, construction, and maintenance across the globe.
Conventional Development
Growth of Green Building

In U.S. alone, buildings account for 41% of energy use, 73% of electricity consumption, and 38% of all CO2 emissions. Globally, buildings use 40% of raw materials, or 3 billion tons annually.
Rating System

- LEED for New Construction
- LEED for Core & Shell
- LEED for Schools
- LEED for Healthcare*
- LEED for Retail*
- LEED for Commercial Interiors
- LEED for Retail Interiors*
- LEED for Existing Buildings
- LEED for Existing Schools*

Reference Guide

- GREEN BUILDING DESIGN & CONSTRUCTION
  2009 Edition
- GREEN INTERIOR DESIGN & CONSTRUCTION
  2009 Edition
- GREEN BUILDING OPERATIONS & MAINTENANCE
  2009 Edition
Growth of Green Building

3 billion square feet of LEED certified space = 68,870 acres

LEED is in more than 140 countries and territories

(Source: Green Building Certification Institute)
Ecosystem services are the benefits people obtain from ecosystems that support our lives, but are often considered free and not a part of conventional accounting methods.

US $125 trillion per year!
What are Ecosystem Services?

Provisioning Services

*Products obtained from ecosystems*
- Food
- Fresh water
- Fuelwood
- Fiber
- Biochemicals
- Genetic resources

Regulating Services

*Benefits obtained from regulation of ecosystem processes*
- Climate regulation
- Disease regulation
- Water regulation
- Water purification
- Pollination

Cultural Services

*Nonmaterial benefits obtained from ecosystems*
- Spiritual and religious
- Recreation and ecotourism
- Aesthetic
- Inspirational
- Educational
- Sense of place
- Cultural heritage

Supporting Services

*Services necessary for the production of all other ecosystem services*
- Soil formation
- Nutrient cycling
- Primary production

Source: Millennium Ecosystem Assessment
Research on the monetary valuation of ecosystem services

Fig. 1 Cumulative total of ecosystem services valuation studies sourced from EVRI from 1960 to 2008. Source: modified from Christie et al., 2008.

Rudolf de Groot, Luke Brander, Sander van der Ploeg, Robert Costanza, Florence Bernard, Leon Braat, Mike Ch...
2005 Forming Relationships
2006 Research and Development process begins
2007 Standards & Guidelines Preliminary Report
2009 Guidelines and Performance Benchmarks 2009
2010 – 2012 Pilot Program
2013 Refinement and Completion of Rating System
2014 SITES v2 Rating System / Reference Guide
2015 Education + Outreach
2016 Professional Credentialing
2017

SITES Timeline

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<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1: Site Context</td>
<td>Site Context</td>
</tr>
<tr>
<td>Section 2: Pre-Design Assessment + Planning</td>
<td>Pre-Design Assessment + Planning</td>
</tr>
<tr>
<td>Section 3: Site Design – Water</td>
<td>Site Design – Water</td>
</tr>
<tr>
<td>Section 4: Site Design – Soil + Vegetation</td>
<td>Site Design – Soil + Vegetation</td>
</tr>
<tr>
<td>Section 5: Site Design – Materials</td>
<td>Site Design – Materials</td>
</tr>
<tr>
<td>Section 6: Site Design – Human Health + Well-Being</td>
<td>Site Design – Human Health + Well-Being</td>
</tr>
<tr>
<td>Section 7: Construction</td>
<td>Construction</td>
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<tr>
<td>Section 8: Operations + Maintenance</td>
<td>Operations + Maintenance</td>
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<tr>
<td>Section 9: Education + Performance Monitoring</td>
<td>Education + Performance Monitoring</td>
</tr>
<tr>
<td>Section 10: Innovation + Exemplary Performance</td>
<td>Innovation + Exemplary Performance</td>
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## Section 3: Site Design – Water

<table>
<thead>
<tr>
<th>Prerequisite/ Credit</th>
<th>Title</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water P3.1</td>
<td>Manage precipitation on site</td>
<td>Required</td>
</tr>
<tr>
<td>Water P3.2</td>
<td>Reduce water use for landscape irrigation</td>
<td>Required</td>
</tr>
<tr>
<td>Water C3.3</td>
<td>Manage precipitation beyond baseline</td>
<td>4-6 points</td>
</tr>
<tr>
<td>Water C3.4</td>
<td>Reduce outdoor water use</td>
<td>4-6 points</td>
</tr>
<tr>
<td>Water C3.5</td>
<td>Design functional stormwater features as amenities</td>
<td>4-5 points</td>
</tr>
<tr>
<td>Water C3.6</td>
<td>Restore aquatic ecosystems</td>
<td>4-6 points</td>
</tr>
</tbody>
</table>

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## Section 4: Site Design – Soil + Vegetation

<table>
<thead>
<tr>
<th>Prerequisite/Credit</th>
<th>Title</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil+Veg P4.1</td>
<td>Create and communicate a soil management plan</td>
<td>Required</td>
</tr>
<tr>
<td>Soil+Veg P4.2</td>
<td>Control and manage invasive plants</td>
<td>Required</td>
</tr>
<tr>
<td>Soil+Veg P4.3</td>
<td>Use appropriate plants</td>
<td>Required</td>
</tr>
<tr>
<td>Soil+Veg C4.4</td>
<td>Conserve healthy soils and appropriate vegetations</td>
<td>4-6 points</td>
</tr>
<tr>
<td>Soil+Veg C4.5</td>
<td>Conserve special status vegetation</td>
<td>4 points</td>
</tr>
<tr>
<td>Soil+Veg C4.6</td>
<td>Conserve and use native plants</td>
<td>3-6 points</td>
</tr>
<tr>
<td>Soil+Veg C4.7</td>
<td>Conserve and restore native plant communities</td>
<td>4-6 points</td>
</tr>
<tr>
<td>Soil+Veg C4.8</td>
<td>Optimize biomass</td>
<td>1-6 points</td>
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<tr>
<td>Soil+Veg C4.9</td>
<td>Reduce urban heat island effects</td>
<td>4 points</td>
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<tr>
<td>Soil+Veg C4.10</td>
<td>Use vegetation to minimize building energy use</td>
<td>1-4 points</td>
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<tr>
<td>Soil+Veg C4.11</td>
<td>Reduce the risk of catastrophic wildfire</td>
<td>4 points</td>
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</table>
Section 4: Site Design – Soil + Vegetation
Stone Brewing World Bistro & Gardens
Escondido, California

Image credit: John Durant
© 2015 Sustainable Sites Initiative™
Stone Brewing World Bistro & Gardens
Escondido, California

Image credit: John Durant
© 2015 Sustainable Sites Initiative™
### Section 5: Site Design – Materials

<table>
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<tr>
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<th>Points</th>
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<tbody>
<tr>
<td>Materials P5.1</td>
<td><strong>Eliminate the use of wood from threatened tree species</strong></td>
<td><strong>Required</strong></td>
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<tr>
<td>Materials C5.2</td>
<td>Maintain on-site structures and paving</td>
<td>2-4 points</td>
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<tr>
<td>Materials C5.3</td>
<td>Design for adaptability and disassembly</td>
<td>3-4 points</td>
</tr>
<tr>
<td>Materials C5.4</td>
<td>Reuse salvaged materials and plants</td>
<td>3-4 points</td>
</tr>
<tr>
<td>Materials C5.5</td>
<td>Use recycled content materials</td>
<td>3-4 points</td>
</tr>
<tr>
<td>Materials C5.6</td>
<td>Use regional materials</td>
<td>3-5 points</td>
</tr>
<tr>
<td>Materials C5.7</td>
<td>Support responsible extraction of raw materials</td>
<td>1-5 points</td>
</tr>
<tr>
<td>Materials C5.8</td>
<td>Support transparency and safer chemistry</td>
<td>1-5 points</td>
</tr>
<tr>
<td>Materials C5.9</td>
<td>Support sustainability in materials manufacturing</td>
<td>1-5 points</td>
</tr>
<tr>
<td>Materials C5.10</td>
<td>Support sustainability in plant production</td>
<td>1-5 points</td>
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</table>
Section 5: Site Design – Materials
## Section 6: Site Design – Human Health + Well-Being

<table>
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<tr>
<td>HHWB C6.1</td>
<td>Protect and maintain cultural and historic places</td>
<td>2-3 points</td>
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<tr>
<td>HHWB C6.2</td>
<td>Provide optimum site accessibility, safety, and wayfinding</td>
<td>2 points</td>
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<tr>
<td>HHWB C6.3</td>
<td>Promote equitable site use</td>
<td>2 points</td>
</tr>
<tr>
<td>HHWB C6.4</td>
<td>Support mental restoration</td>
<td>2 points</td>
</tr>
<tr>
<td>HHWB C6.5</td>
<td>Support physical activity</td>
<td>2 points</td>
</tr>
<tr>
<td>HHWB C6.6</td>
<td>Support social connection</td>
<td>2 points</td>
</tr>
<tr>
<td>HHWB C6.7</td>
<td>Provide on-site food production</td>
<td>3-4 points</td>
</tr>
<tr>
<td>HHWB C6.8</td>
<td>Reduce light pollution</td>
<td>4 points</td>
</tr>
<tr>
<td>HHWB C6.9</td>
<td>Encourage fuel efficient and multi-modal transportation</td>
<td>4 points</td>
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<tr>
<td>HHWB C6.10</td>
<td>Minimize exposure to environmental tobacco smoke</td>
<td>1-2 points</td>
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<tr>
<td>HHWB C6.11</td>
<td>Support local economy</td>
<td>3 points</td>
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</table>
Section 6: Site Design – Human Health + Well-Being
Section 6: Site Design – Human Health + Well-Being
## Section 9: Education + Performance Monitoring

<table>
<thead>
<tr>
<th>Prerequisite/Credit</th>
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<th>Points</th>
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<tbody>
<tr>
<td>Education C9.1</td>
<td>Promote sustainability awareness and education</td>
<td>3-4 points</td>
</tr>
<tr>
<td>Education C9.2</td>
<td>Develop and communicate a case study</td>
<td>3 points</td>
</tr>
<tr>
<td>Education C9.3</td>
<td>Plan to monitor and report site performance</td>
<td>4 points</td>
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</tbody>
</table>
SITES Certified Pilot Projects

PILOT PROJECT TYPES
- Open Space / Park
- Institutional / Educational
- Commercial
- Residential
- Streetscape / Transportation
- Garden / Arboretum
- Government
- Mixed Use
- Industrial

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SITES Certified Pilot Projects

34 Certified To-Date

- 15 Open Space/ Park
- 8 Educational
- 5 Garden/ Arboretum
- 5 Commercial
- 3 Government
- 2 Residential
- 1 Industrial
- 1 Mixed Use

…and 12 more under review

© 2015 Sustainable Sites Initiative™
Scenic Hudson’s Long Dock Park
Beacon, New York  |  Park  |  14 acres
© 2015 Sustainable Sites Initiative™
Scenic Hudson’s Long Dock Park
Beacon, New York  |  Park  |  14 acres
Scenic Hudson’s Long Dock Park
Beacon, New York  |  Park  |  14 acres

Image credit: Reed Hilderbrand LLC
© 2015 Sustainable Sites Initiative™
Hunts Point Landing
Bronx, New York | Park | 1.5 acres

© 2015 Sustainable Sites Initiative™
Hunts Point Landing
Bronx, New York | Park | 1.5 acres

© 2015 Sustainable Sites Initiative™
Washington Canal Park
Washington, D.C. | 3 acres | Open Space - Park

Image credit: OLIN / Karl Blumenthal

before

© 2014 Sustainable Sites Initiative™
Washington Canal Park

Washington, D.C. | 3 acres | Open Space - Park

Image credit: OLIN / Karl Blumenthal
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SITES v2 Rating System + Reference Guide

PROFESSIONS

- Landscape Architects
- Planners
- Other / Blank
- Educators
- Architects
- Sustainability Consultants
- Designers
- Engineers
- Government
- Facility Managers / Maintenance
- Horticulturists
- Ecologists
- Contractors
- Developers
- Growers / Nursery Staff
- Botanists
- Product Manufacturers
- Builders

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Eligible Projects

- New construction or major renovations
- No maximum size
- Minimum of 2,000 square feet
- All project types on sites with or without buildings
- Applicable outside U.S.
200 Points Total

70 points  SITES CERTIFIED

85 points  SITES SILVER

100 points  SITES GOLD

135 points  SITES PLATINUM

SITES v2 Certification Levels

© 2015 Sustainable Sites Initiative™
Knowledge gained in developing the Sustainable Sites Initiative served as background for many of the recommendations provided by the working group.
LANDSCAPE
PERFORMANCE
SERIES
501(c)(3) nonprofit based in Washington, DC

Established in 1966 to preserve, improve, and enhance the environment.

Increase our collective capacity to achieve sustainability:

- Invested $2.2 million in research since 1986
- Awarded nearly $1.1 million in scholarships to over 500 students
Can’t achieve **SUSTAINABILITY** without considering **LANDSCAPE**

**MEASURING SUSTAINABILITY**

- **Triple Bottom Line**
  - Social
  - Environmental
  - Economic

- **Living Building Challenge**
  - Beauty & Inspiration
  - Indoor Quality
  - Water
  - Energy
  - Materials
  - Site

- **One Planet Principles**
  1. Zero carbon
  2. Zero waste
  3. Sustainable transport
  4. Sustainable materials
  5. Local and sustainable food
  6. Sustainable water
  7. Land use and wildlife
  8. Culture and heritage
  9. Equity and local economy
  10. Health and happiness
A CASE STUDY COMPARISON

- Reduces water use by 30% compared to a building with standard code-compliant fixtures
- Uses 51,300 kBtu/ft$^2$ of energy annually, a 39% reduction from base case
- Reduces carbon emissions by 19 lbs CO$_2$/ft$^2$, or 50% by purchasing renewable energy.
- Provides daylight for 75% of regularly occupied spaces and views for 90% of occupied work areas
A CASE STUDY COMPARISON

- Stormwater planters
- 20 new street trees
- Native and adapted plants
- 5 new outdoor dining areas
- Energy-efficient light blades
- Benches made from local stone
A CASE STUDY COMPARISON

- Captures and cleans stormwater runoff
- Reduces the urban heat island effect
- Sequesters carbon
- Reduces potable water use
- Reduced energy use
- Increases social value of space
Captures and infiltrates 50% of all rain falling on sidewalks.

Sequesters 3,000 lbs of carbon annually in tree biomass.

Reduced energy consumption for outdoor lighting by 55,000 kilowatts, saving $3,200 annually.

Increased restaurant patronage by 30% on weekdays and 50% on weekends.
THE ONLINE RESOURCE

- Find precedents, show value, and make the case for sustainable landscape solutions
- Explore metrics and methods to quantify environmental, social, and economic benefits
- Earn professional development hours (PDHs) by attending a presentation or webinar
- Browse and share teaching materials to integrate landscape performance into design curricula
- Stay current on landscape performance news and trends
LPS TARGET AUDIENCES

- Landscape architects
- Allied design/development professionals
  - Planners
  - Architects
  - Engineers
  - Developers
- Non-profit organizations advocating for sustainable development
- Federal and municipal agencies
- Corporations with sustainability agendas
# LPS AND SITES

## SITES
- Modeled after LEED
- For sites that will be protected, developed, or redeveloped
- Encourages setting numerical goals
- Requires collection of baseline data
- Provides tools to estimate performance
- Encourages “Human Health and Well Being”

## LPS
- Not a rating system
- Focuses on measurable performance of built landscapes
- Easier to evaluate with numerical goals
- Requires collection of baseline data
- Provides tools to estimate performance
- Measures social and economic impact

---

**COMPLEMENTARY approaches which STRENGTHEN one another**
THE ONLINE RESOURCE

Meet The Next-Generation

LANDSCAPE PERFORMANCE SERIES

www.LandscapePerformance.org

Case Study Briefs
Database of over 100 exemplary projects with quantified landscape benefits

Fast Fact Library
Nearly 200 facts on the benefits of landscape derived from published research

Benefits Toolkit
Dozens of online calculators and tools to estimate landscape performance

Collections
Themed LPS highlights curated by LAF and leading thinkers
Empirical evidence indicates “livable” street treatments are safer than conventional roadway designs. In analyzing crash data, livable sections had fewer accidents and pedestrian crashes.

The first protected bike lanes in the US, on 8th and 9th Avenues in Manhattan, led to a 35% decrease in injuries to all users on 8th Avenue and a 58% decrease in injuries to all users on 9th Avenue.

A Modesto, California study found that asphalt on streets shaded by large canopy trees lasts longer than asphalt on unshaded streets, reducing maintenance costs by 60% over 30 years.

Children with Attention Deficit Hyperactivity Disorder (ADHD) concentrate better after a walk in a city park than after walks in other urban settings.

Recovering surgery patients with window views of trees had 10% shorter hospital stays, took fewer potent pain killers, and had fewer negative notes recorded by their attending nurses than patients with views of a brick wall.

Consumers are willing to spend 9-12% more for goods and services in central business districts with high quality tree canopy.

Atlanta's promotion of public transportation during the 1996 Summer Olympic Games led to a 22% decline in traffic counts, 28% decline in ozone concentrations, and a 41% decrease in asthma acute-care events.

GBRL Green Roof Energy Calculator (v 2.0)

Green Roofs for Healthy Cities, Portland State University, University of Toronto

This calculator compares the annual energy performance of a building with a green roof to the same building with either a conventional dark roof or a highly-reflective white roof. Inputs include nearest major city, total roof area, percent green roof cover, growing media depth, and leaf area index of plants. Results are the electrical, gas, and energy cost savings, heat exchange between the roof and the urban environment, and an estimate of the annual roof water balance, including net runoff.

http://greenbuilding.pdx.edu/GR_CALC_v2/ grcalc_v2.php#retain
Renaissance Park

Landscape Performance Benefits

**ENVIRONMENTAL**

- Removed 34,000 cu yd of contaminated soil from the 100-year floodplain and sealed it safely within the park’s iconic landforms. This includes 12,000 cu yd of soil containing leachate from a where contaminants into groundwater.

- Increased floodplain storage by 9.32 acre feet (15,047 cu yd) through excavation of contaminated soil and creation of a constructed wetland.
Landscape Performance Benefits

ENVIRONMENTAL

- Removed 34,000 cu yd of contaminated soil from the 100-year floodplain and sealed it safely within the park’s iconic landforms. This includes 12,000 cu yd of soil commingled with enamel frit, which was leaking contaminants into groundwater.
- Increased floodplain storage by 9.32 acre feet (15,047 cu yd) through excavation of contaminated soil and creation of a constructed wetland.

SOCIAL

- Promotes a healthy lifestyle, according to 85% of 85 park users surveyed. 81% agree that the park increases their outdoor activity.
- Attracts an estimated 145,220 visitors annually, many of whom also patronize local businesses. 89% of 85 surveyed park users shop or dine within 1/2 mile of the park before or after visiting the park.

ECONOMIC

- Stimulates economic development and neighborhood reinvestment. Since 2005, $55 million has been invested in two redevelopment projects adjacent to Renaissance Park. Five additional properties within 1/4 mile of the park were redeveloped between 2005 and 2013.

View/Download a PDF showing how the landscape performance benefits were derived.
2. Increases floodplain storage by 9.33 acre feet (15,047 cu yd.) due to excavation of contaminated soil below 100 year floodplain elevation and creation of a constructed wetland.

Methodology:
This performance indicator is based on the thorough review of information provided and cut/fill calculations performed by the project’s consulting team as well as calculations performed by the research team.

The portion of the site where contaminated soils were excavated from capped waste cells of enamel frit was excavated as much as 10’ below finished grade. This +/- one acre area is creatively redesigned as a one-acre constructed wetland that receives, retains, and treats runoff from the site while increasing the storage capacity of the 100 year flood by 9.33 acre feet.
**Renaissance Park** is a 22-acre urban brownfield redevelopment project within Chattanooga's nationally-recognized Tennessee River Park and the final phase of the 21st Century Waterfront Master Plan. Completed in 2006, this riverfront project transformed a blighted post-industrial site known to be leaching contaminants into surface and groundwater resources into a celebrated public park that has been a catalyst for reinvestment in Chattanooga's growing Northshore neighborhood. Renaissance Park provides a canvas for social engagement, healthy lifestyles, and environmental education, leveraging ecosystem services of preserved floodplain forest, meadow plantings and a constructed wetland that treats site stormwater and increases floodplain storage capacity. Preservation areas and native meadows reduce construction and maintenance costs, while iconic landforms safely and artistically enclose contaminated soils. The park hosts public events, exhibitions of public art, and commemorates the site's role in significant historic.
### At a Glance

<table>
<thead>
<tr>
<th>DESIGNER</th>
<th>Margreaves Associates</th>
</tr>
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<tbody>
<tr>
<td>LOCATION</td>
<td>100 Manufacturers Road 37405</td>
</tr>
<tr>
<td>PARK/OPEN SPACE</td>
<td>Chattanooga, Tennessee Map it</td>
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<tr>
<td>SIZE</td>
<td>22 acres</td>
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<tr>
<td>BUDGET</td>
<td>$8 million</td>
</tr>
<tr>
<td>CLIMATE ZONE</td>
<td>Humid subtropical</td>
</tr>
<tr>
<td>COMPLETION DATE</td>
<td>2006</td>
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<tr>
<td>FORMER LAND USE</td>
<td>Brownfield Park/Open space</td>
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</tbody>
</table>

### Overview

- Test wells indicated a bloom of contaminated groundwater down-gradient from the known location of previously capped industrial waste settling ponds within the 100-year flood plain. 34,000 cu yd of contaminated soils were excavated and placed in upland containment cells, safely sealed within the park’s iconic landforms. A drainage system beneath the cells diverts any lingering leachate to the sanitary sewer.

- The portion of the site from which contaminated soils were excavated was creatively redesigned as a one-acre constructed wetland. This feature receives, holds and treats runoff from the site while increasing floodplain storage capacity by 9.32 acre feet. The wetland is lined with a bentonite geosynthetic clay liner to prevent further groundwater contamination. Two feet of freeboard is provided between the wetland’s normal pool level and outfall orifices which discharge into the stream. Gabions, buffered with wetland plantings, artfully establish the water’s meandering path through the wetland.
## Challenge

Monitoring wells installed as part of environmental assessment efforts indicated that capped waste cells located within the site’s 100-year flood plain were leaching semi-volatile organic compounds (SVOCs) and heavy metal contaminants into the groundwater. These cells contained postindustrial waste from the site’s previous use as an appliance manufacturing and enameling facility. Until environmental regulation outlawed such practices, post-process wastes – including enamel frit – were disposed of on-site in receiving cells that were capped once full.

## Solution

Following extensive analysis of historic site topographic maps to determine the probable...
CASE STUDY BRIEFS

At a Glance

**DESIGNER**
Hargreaves Associates

**LOCATION**
100 Manufacturers Road
Chattanooga, Tennessee
37405

**PROJECT TYPE**
Park/Open space
Waterfront redevelopment

**CLIMATE ZONE**
Humid subtropical

**FORMER LAND USE**
Brownfield Park/Open space

**SIZE**
22 acres

**BUDGET**
$8 million

**COMPLETION DATE**
2006

**OVERVIEW**

- The client explored alternative “hard engineering solutions” to manage contaminated soils and prevent further groundwater contamination, such as subterranean groundwater diversion walls and an asphalt cap. The implemented “soft” approach was 25% less expensive than these alternatives.

- Remediating 12,000 cubic yards of leaching soil containing commingled frit on site cost $180,000, 75% less than the $720,000 estimated cost to haul the same volume of soil to a proper landfill.
Accurately calculating the volume of contaminated soil that would be excavated and remediated was critical to managing project budgets. The cost of excavation and remediation activities would limit budget available for other site development agendas and features, and the volume of soil to be treated would dictate the amount of area to be committed to the encapsulation of contaminated soil. The design team was not comfortable basing estimates on conventional methods of extrapolating data from a grid of soil borings alone. Therefore, they conducted a “forensic” topographic analysis using historical maps of the site’s undeveloped and post-industrial conditions, in addition to analysis of 50 soil borings and groundwater monitoring data to generate three-dimensional models of the likely extent of contaminated soil. This in-depth analysis gave the design team the information necessary to allocate budget for remediation activities and design the site accounting for proper soil storage capacity.
## CASE STUDY BRIEFS

### At a Glance

<table>
<thead>
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<td>Chattanooga, Tennessee</td>
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<tr>
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<td>2006</td>
</tr>
<tr>
<td>FORMER LAND USE</td>
<td>Brownfield Park/Open space</td>
</tr>
</tbody>
</table>

### Products

- **Wetland Liner:** CETCO Bentomat geosynthetic clay liner
- **Wetland Inlets & Outlets:** Agri Drain
- **Light Poles:** Hess
- **Prefabricated Bridges:** Moosman Bridge
- **Site Furniture:** Maglin
### At a Glance

<table>
<thead>
<tr>
<th>Designer</th>
<th>Location</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hargreaves Associates</td>
<td>109 Manufacturers Road Chattanooga, Tennessee 37405</td>
<td>22 acres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Former Land Use</th>
<th>Climate Zone</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownfield Park/Open space</td>
<td>Humid subtropical</td>
<td>2006</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8 million</td>
</tr>
</tbody>
</table>

### Project Team

- **Landscape Architect & Lead Designer**: Hargreaves Associates
- **Structural & Electrical Engineer**: Moffatt & Nichol Engineers
- **Environmental Engineer**: S&ME
- **Lighting Designer**: LAM Partners, Inc.
- **Pavilion Architects**: Eskew+Dumez+Ripple, Hefferlin+Krenenberg Architects
- **Pavilion Engineer**: March Adams & Associates, Inc.
- **Pavilion Lighting Designer**: Fisher Marantz Stone
- **General Contractor**: Stein Construction Corporation
- **Landscape Contractor**: Eardisclapes

**Client**: River City Company for Chattanooga Downtown Redevelopment Corporation
CASE STUDY BRIEFS

Additional Images

References and Resources
Hargreaves Associates: Renaissance Park
Heffernan+Kronenberg Architects: Renaissance Park Outdoor Pavilion
East Tennessee River Valley Geotourism MapGuide
The Chattanooga “Renaissance Park Wins Governor’s Award,” 2007

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laf:casesudy=738

Need Help?
PROJECTS AND BENEFITS
Expected to reduce traffic accidents by 35%.
Captures and reuses 1.4 million gallons of runoff.
Increased nearby property values by $1,500,000.
Increased bicycle traffic by 12% to 3,500 cyclists per day.

Helped reduce pedestrian and cyclist fatalities from a high of 18 to <1 per year.

Increased estimated market value of surrounding properties by 37%.
Filters 4.5 million gallons of runoff from 12.5 acres. Provides habitat for 62 confirmed species birds. Expected to catalyze $152.3 million in development.
Protects 93 acres or 96% of the undisturbed area of the site.

Improved user satisfaction with park amenities by 165% and perceptions of safety by 101%.

Tripled annual visitation, generating $217,000 in entry fee revenue.
Projected to generate $312.7 million in economic development and $12.7 million in tax revenue.

Improves the quality of life for 91% of the 224 park users surveyed.

Contributed to a 61% increase in ridership on the M-Line trolley, which connects downtown and uptown.
CASE STUDY INVESTIGATION (CSI)

- Unique research collaboration
  - Faculty Research Fellow
  - Student Research Assistant
  - Practitioner
- Document high-performing landscapes
  - New LPS Case Study Briefs

Guided by PRACTICE
Enhanced by RESEARCH
NEW APPROACHES TO RESEARCH
Longer-term Partnerships

- **TKF Foundation**
  - Joplin, Missouri “Landscapes of Resilience” Butterfly Gardens and Overlook project, a 2014 TKF “Open Spaces, Sacred Places” award recipient
  - Research Team: Stephanie Rolley and graduate student assistant of the Kansas State University Landscape Architecture Program

- **General Services Administration (GSA)**
  - United States Coast Guard Headquarters in Washington, DC neighborhood of St. Elizabeths/Congress Heights
  - Research Team: Dr. Chris Ellis and Dylan Reilly of the University of Maryland Landscape Architecture Program
Serves local residents and workers, with 78% of visitors come from within 1/2 mile of the park.

Encourages social interaction, with 25% of survey respondents having made new acquaintances in the park.

Improves neighborhood safety for 81% of those surveyed, compared to 45% in 2008.
Most people surveyed only walk 1-2 blocks to get to the park, not the standard ¼ mile assumption. Despite research indicating people like the high vantage point, the roof viewing platform is not utilized. Roof-mounted cameras were used to take photos every 3 seconds; surveys taken every season.
LPS RESULTS

- Transforming design practice, education, and industry
- Making advocates more effective
- Building the body of knowledge
- Operationalizing and energizing aspirations for change

AILA/Yamagami/Hope Fellowship

Promotional Partner