SITES
Journey Towards Sustainability Case Study

Margot Taylor RLA, Land Ethics
Edgar David RLA, SED Design

THE SUSTAINABLE SITES INITIATIVE™

An interdisciplinary effort to create national guidelines and a voluntary rating system for sustainable land design, construction and maintenance.

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
ASLA Library & Education Advocacy Fund

Lady Bird Johnson Wildflowercenter
THE UNIVERSITY OF TEXAS AT AUSTIN

United States Botanic Garden

Guiding Principles

- Do no harm
- Use the precautionary principle
- Design with nature and culture
- Use a decision-making hierarchy of conservation, restoration and regeneration
- Provide regenerative systems as intergenerational equity
- Support a living process
- Use a systems thinking approach
- Use a collaborative and ethical approach
- Maintain integrity in leadership and research
- Instill a sense of stewardship

Image: Lady Bird Johnson Wildflower Center

Success of Green Building

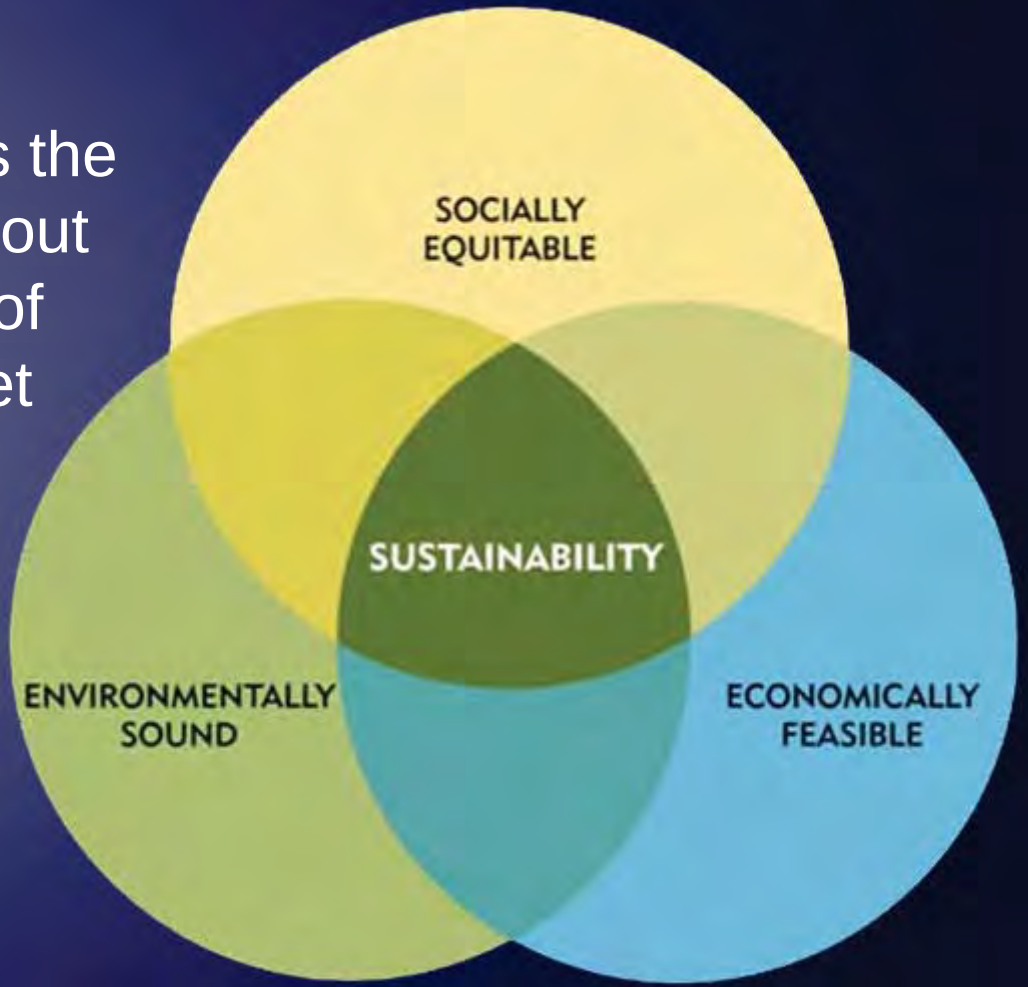
- As of 2010, green building accounted for 25% of all new construction activity
- The green building market size is expected to reach $135 billion by 2015
- The value of green building construction starts was up 50% from 2008 to 2010 (during the recession)
- Over 160,000 professionals hold LEED credentials

Source: McGraw-Hill Construction (2010). Green Outlook 2011: Green Trends Driving Growth

Sustainable Development

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Brundtland Report,
*Our Common Future (*1987)

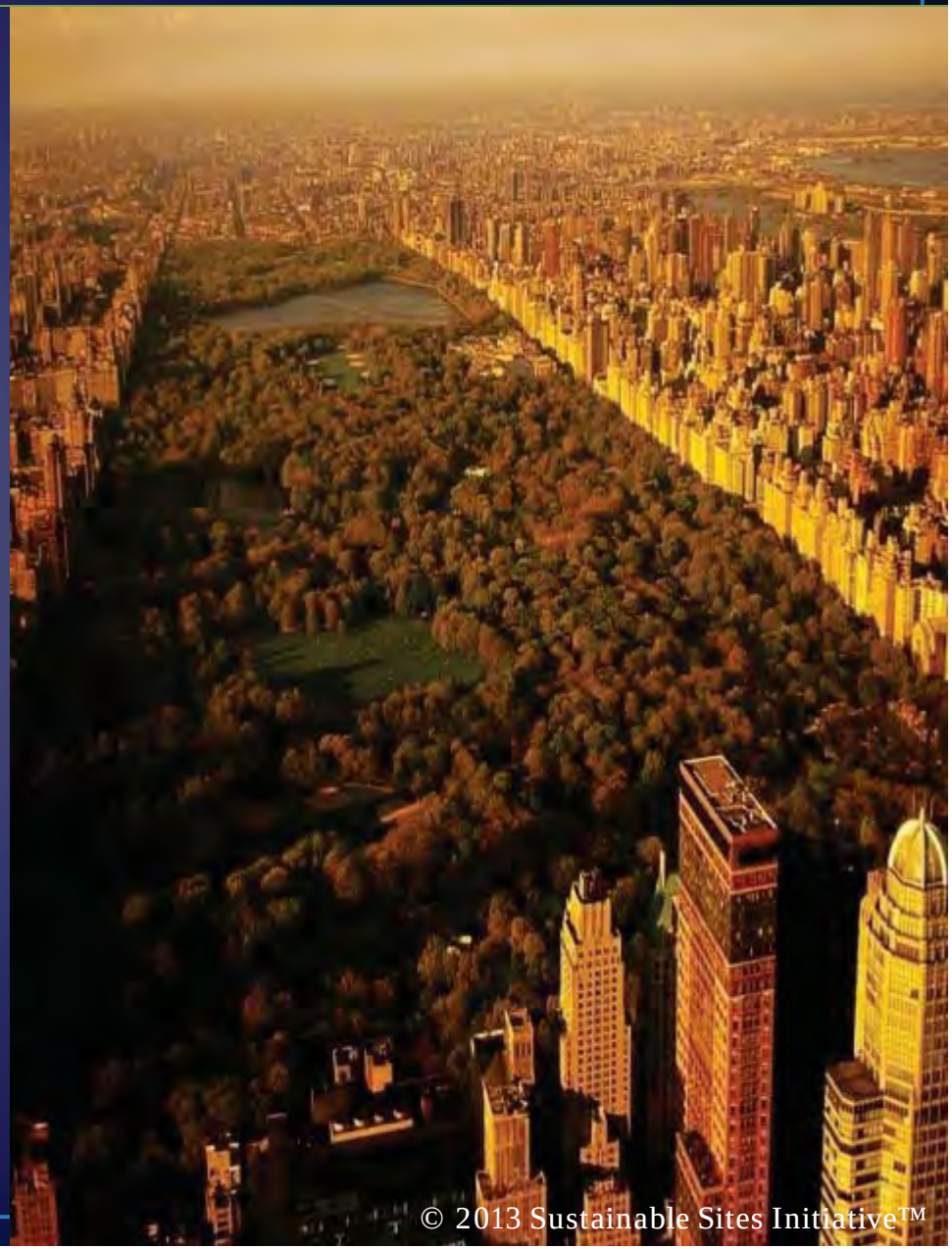


SITES Framework: *Ecosystem Services*

Benefits provided by natural systems that support our lives and are often considered “free” and not a part of conventional accounting methods

In 1997, these were estimated to be worth $33 trillion per year (twice the global GNP)

Source: Costanza et al. 1997



Framework: *Ecosystem Services*

- Regulate global and local climate
- Detoxify and cleanse air, soil and water
- Regulate water supply
- Control erosion and retain sediment
- Provide refuge and nursery habitat / pollination services
- Decompose, treat, and re-use waste
- Provide human health and well-being benefits
- Provide food and non-food products
- Provide cultural, educational and aesthetic values
- Mitigate potential hazards

Woodland Garden Aqua-duct by SED Design

Hillside Water Garden Pool by SED Design

SITES Goals: Shift of Values

Conservation to Regeneration through High Performance Landscapes

Schedule

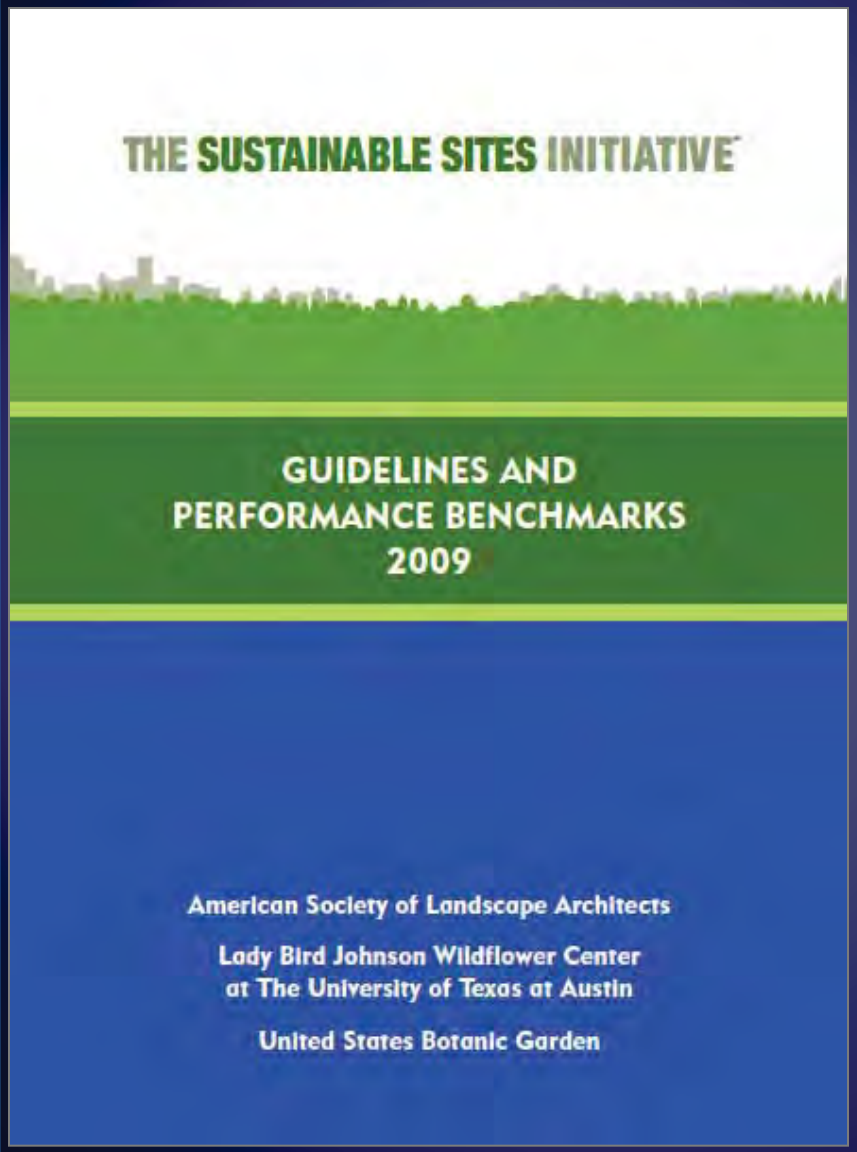
PROJECT TIMELINE:

Guidelines & Performance Benchmarks 2009:	Released November 2009
Pilot Program	June 2010 – June 2012
Public Comment Period on Proposed 2013 Credits	Sept. 26 – Nov. 26, 2012
Release of *2013 Rating System/Reference Guide*	Fall 2013
Open Enrollment / Education + Training	Fall 2013
Professional Credentialing Program	Anticipated in 2014

Project Applications

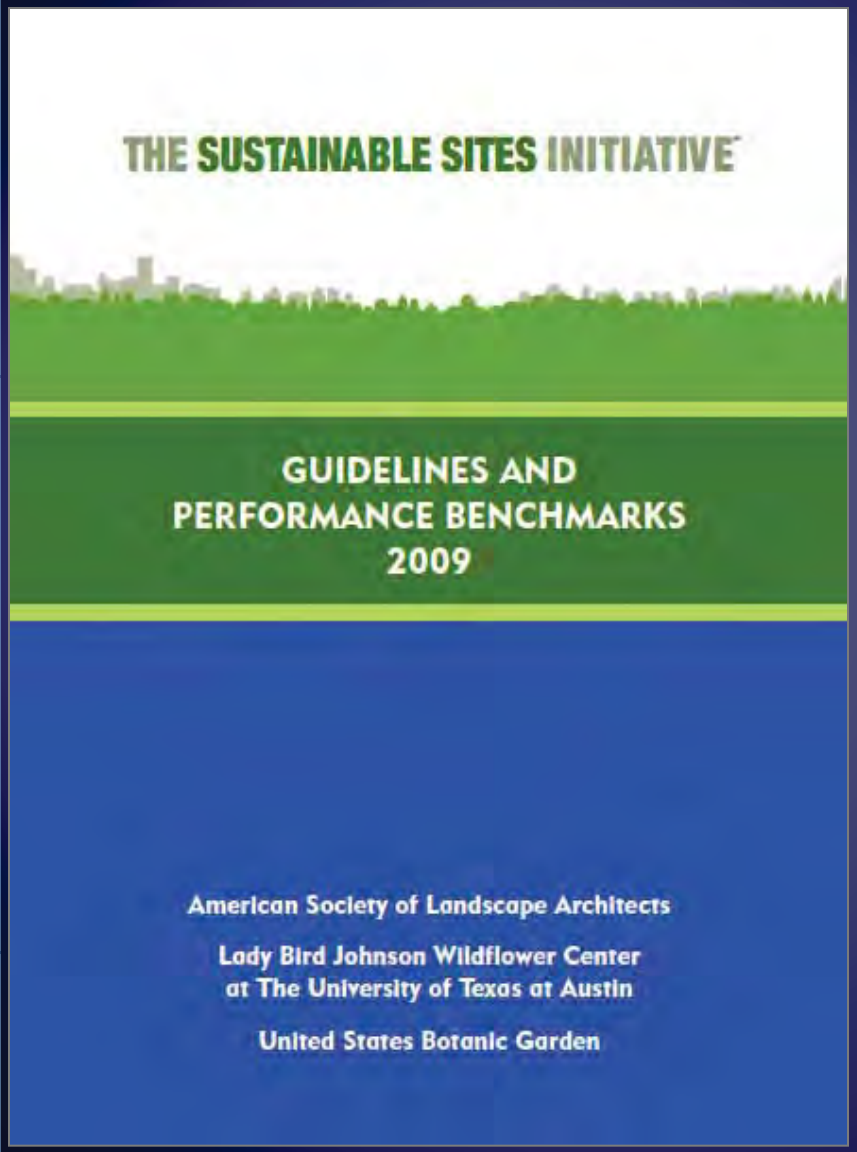
- parks, trails, campgrounds
- industrial & office parks
- government & medical complexes
- botanical gardens
- university campuses
- residential sites
- streetscapes & plazas

SITES 2009 Rating System



- Measures site sustainability within the context of ecosystem services
- Applies to new construction or major renovations of existing sites
- 250 point scale
- Performance based benchmarks
- 4 levels of certification
  Prerequisites plus:
  - ★ = 100 points (40%)
  - ★★ = 125 points (50%)
  - ★★★ = 150 points (60%)
  - ★★★★ = 200 points (80%)
- Note, this will be updated and replaced by the forthcoming *2013 Rating System*

SITES 2009 Rating System: Categories



- **Site Selection**
  Preserve existing resources & repair damaged systems
- **Pre-Design Assessment and Planning**
  Plan for sustainability from the onset of the project
- **Site Design – Water**
  Protect and restore site processes and systems
- **Site Design – Soil and Vegetation**
  Protect and restore site processes and systems
- **Site Design – Materials Selection**
  Reuse/recycle & support sustainable production practices
- **Site Design – Human Health and Well-Being**
  Build communities and a sense of stewardship
- **Construction**
  Minimize effects of construction-related activities
- **Operations and Maintenance**
  Maintain the site for long-term sustainability
- **Monitoring and Innovation**
  Reward exceptional performance

SITES 2009 Rating System: Credit Structure

Each Prerequisite and Credit includes:

- Credit Intent
- Requirements
- Submittal Documentation
- Potential Technologies and Strategies
- Links to Other Credits
- Resources

Site Selection

Guidelines & Performance Benchmarks 2009

21 possible points

Select locations to preserve existing resources and repair damaged systems

Prerequisite 1.1: Limit development of soils designated as prime farmland, unique farmland, and farmland of statewide importance

Prerequisite 1.2: Protect floodplain functions

Prerequisite 1.3: Preserve wetlands

Prerequisite 1.4: Preserve threatened or endangered species and their habitats

Credit 1.5: Select brownfields or greyfields for redevelopment (5-10 points)

Credit 1.6: Select sites within existing communities (6 points)

Credit 1.7: Select sites that encourage non-motorized transportation and use of public transit (5 points)

Site Selection

Credit 1.5

Select brownfields or greyfields for redevelopment

- During the site selection process, give preference to previously developed or brownfield sites
- Coordinate site development plans with remediation activity and use of existing infrastructure and materials, as appropriate
- 5 points for selecting greyfield
- 10 points for selecting brownfield

Site Design – Water

Guidelines & Performance Benchmarks 2009

44 possible points

Protect and restore processes and systems associated with a site's hydrology

Prerequisite 3.1: Reduce potable water use for landscape irrigation by 50 percent from established baseline

Credit 3.2: Reduce potable water use for landscape irrigation by 75 percent or more from established baseline (2-5 points)

Credit 3.3: Protect and restore riparian, wetland, and shoreline buffers (3-8 points)

Credit 3.4: Rehabilitate lost streams, wetlands, and shorelines (2-5 points)

Credit 3.5: Manage stormwater on site (5-10 points)

Credit 3.6: Protect and enhance on-site water resources and receiving water quality (3-9 points)

Credit 3.7: Design rainwater/stormwater features to provide a landscape amenity (1-3 points)

Credit 3.8: Maintain water features to conserve water and other resources (1-4 points)

Site Design – Water

Credit 3.7

Design rainwater / stormwater features to provide a landscape amenity

- Make rainwater / stormwater management features visible, usable, and beautiful
- Document that rainwater falling on site is treated as an amenity through the way it is received, conveyed, and managed on site, and made accessible to site users
- Keep water healthy and clean with natural, chemical-free techniques

Operations and Maintenance

Guidelines & Performance 2009 Benchmarks

23 possible points

Maintain the site for long-term sustainability

Prerequisite 8.1: Plan for sustainable site maintenance

Prerequisite 8.2: Provide for storage and collection of recyclables

Credit 8.3: Recycle organic matter generated during site operations and maintenance (2-6 points)

Credit 8.4: Reduce outdoor energy consumption for all landscape and exterior operations (1-4 points)

Credit 8.5 Use renewable sources for landscape electricity needs (2-3 points)

Credit 8.6: Minimize exposure to environmental tobacco smoke (1-2 points)

Credit 8.7: Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities (1-4 points)

Credit 8.8: Reduce emissions and promote the use of fuel-efficient vehicles (4 points)

Operations and Maintenance

Prerequisite 8.1

Plan for sustainable site maintenance

- Use an integrated design team to plan for ongoing site maintenance
- Include short and long term strategies
- Use SITES worksheet to ensure adequate coverage

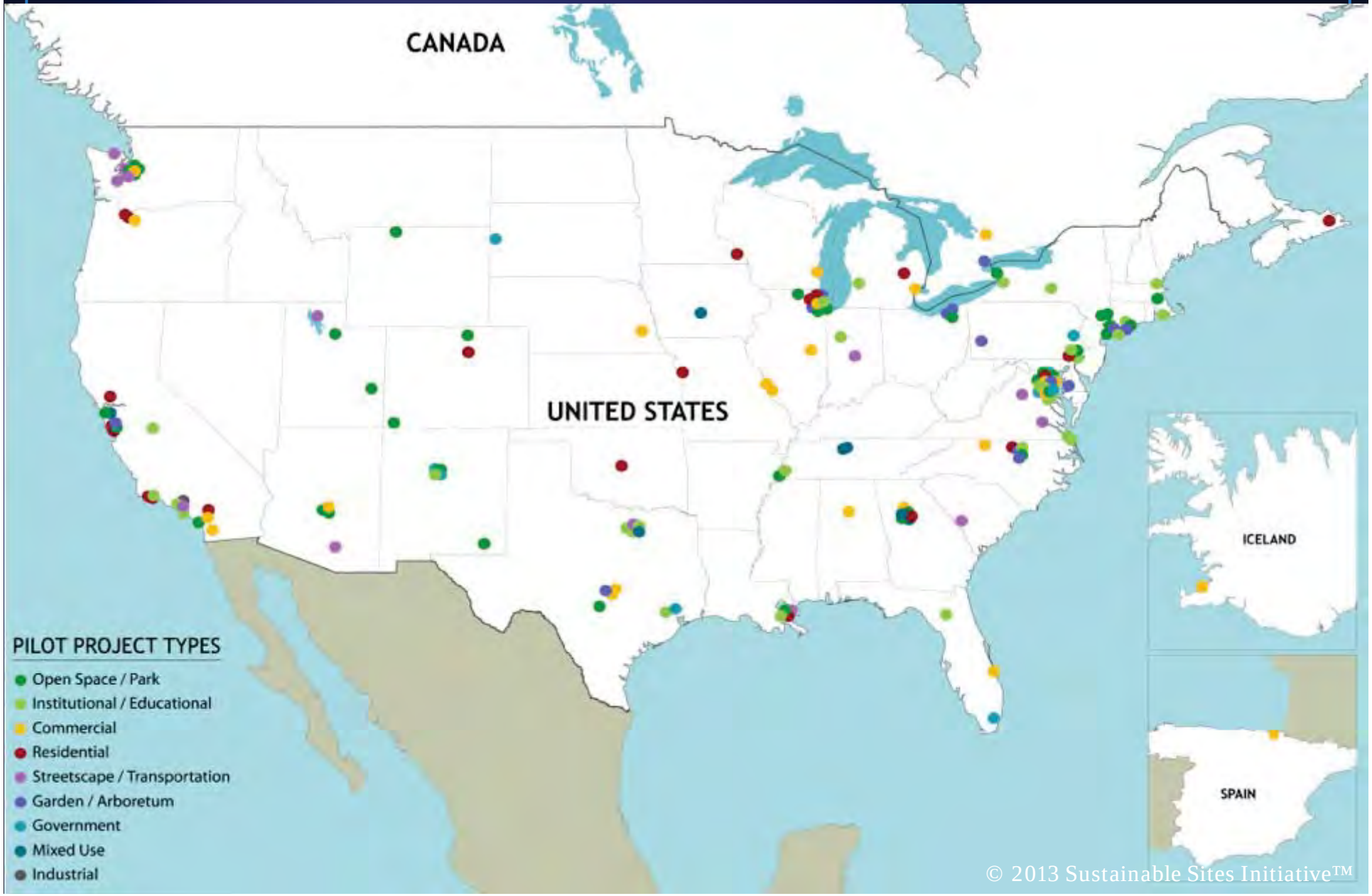
SITES Pilot Program: June 2010 – June 2012

- Over 150 Registered Pilot Projects
- Range of project types and sizes, geographic diversity
- Feedback from Pilot Program to inform Reference Guide

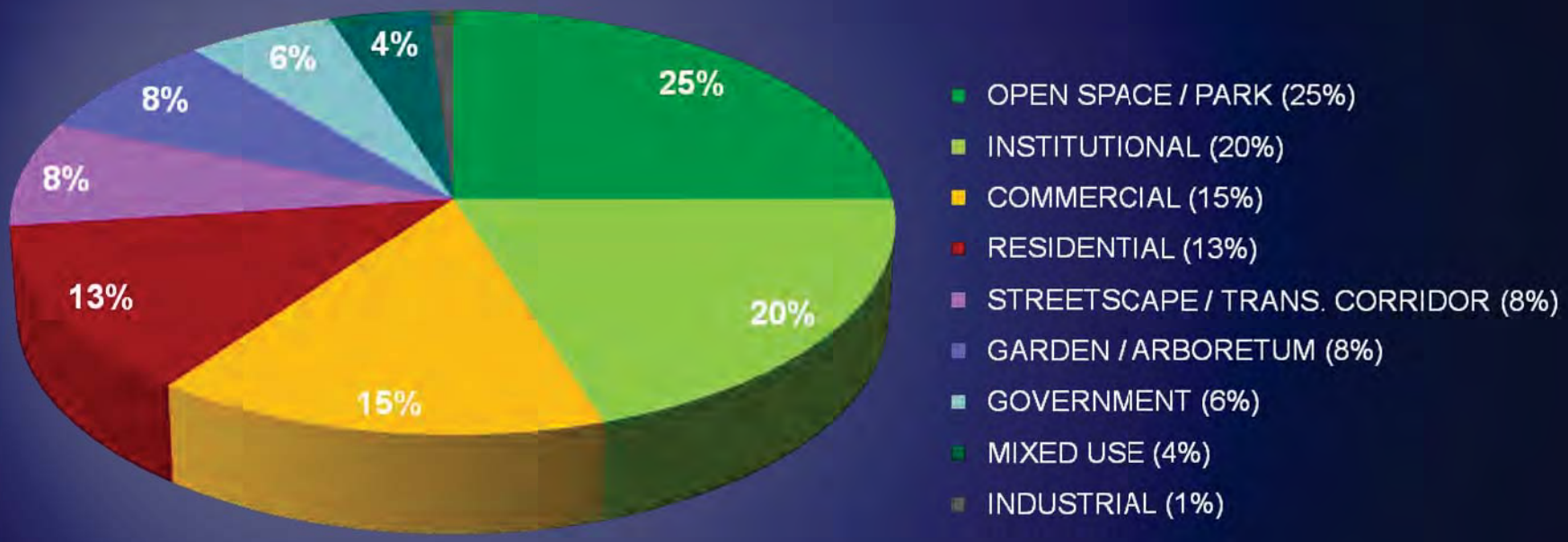
MITHŪN

High Point, Seattle, Washington

SITES Pilot Program



SITES Pilot Program – Project Types



Pleasure Garden in mid spring at Taylor Residence 2009

How it Began

Choosing to participate in SITES Pilot

Major house & site renovations underway

Opportunity to become a demonstration site for sustainable land practices

Professional & career advancement

Getting Started

Review standards and identify those project may qualify

- Target point count: 3 Stars / 169 points
- Project budget and time commitment

- House construction had already begun
  - Improvements sited; septic, driveway, garage, house addition.
  - Basement excavation in process, digging 3’ down



Getting Started

Solicit Design Team & Stakeholder Participation

Design Team

- Margot Taylor, Owner, Landscape Architect, SITES Project Manager
- Edgar David, Landscape Architecture, CAD maps and illustrations
- Russ Losco, Soil Scientist
- Carol Ohm & Steve Williams, Civil Engineering

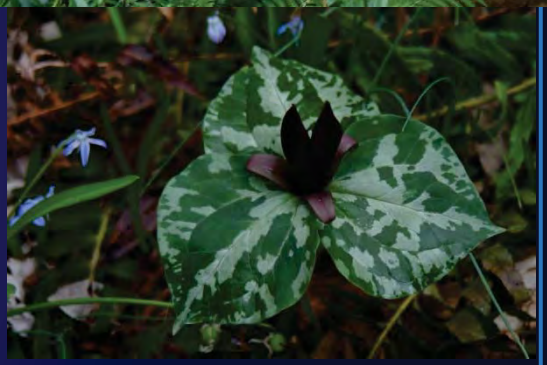
Stakeholders

- Tom Brightman, Land manager, Longwood Gardens
- Dan Barringerr, Land manager, Natural Lands Trust
- Maya Baruch, Permaculture
- Claudia West, Native plants, North Creek Nursery
- Janet Ebert , Botanist
- Robert Struble , Water resources, Red Clay Valley Association
- Tara Tracey , Site planning, formerly with Brandywine Conservancy
- Jeff Wallin, Biochar, The Biochar Company
- Kennett Township Manager, Zoning Officer, Planning Commission
- Robert Johnston, Kennett Township Engineer, Gilmore Associates
- John Bare, Neighbor and land restoration advocate
- Mt Cuba Center, reference site
- Bucktoe Creek Preserve, reference site
- Meadow at Longwood Gardens, reference site

Getting Started Project Goal

Property shall become a landmark demonstration site and educational resource for sustainable practices for water, soil, and vegetation conservation, land management, human health and well-being.

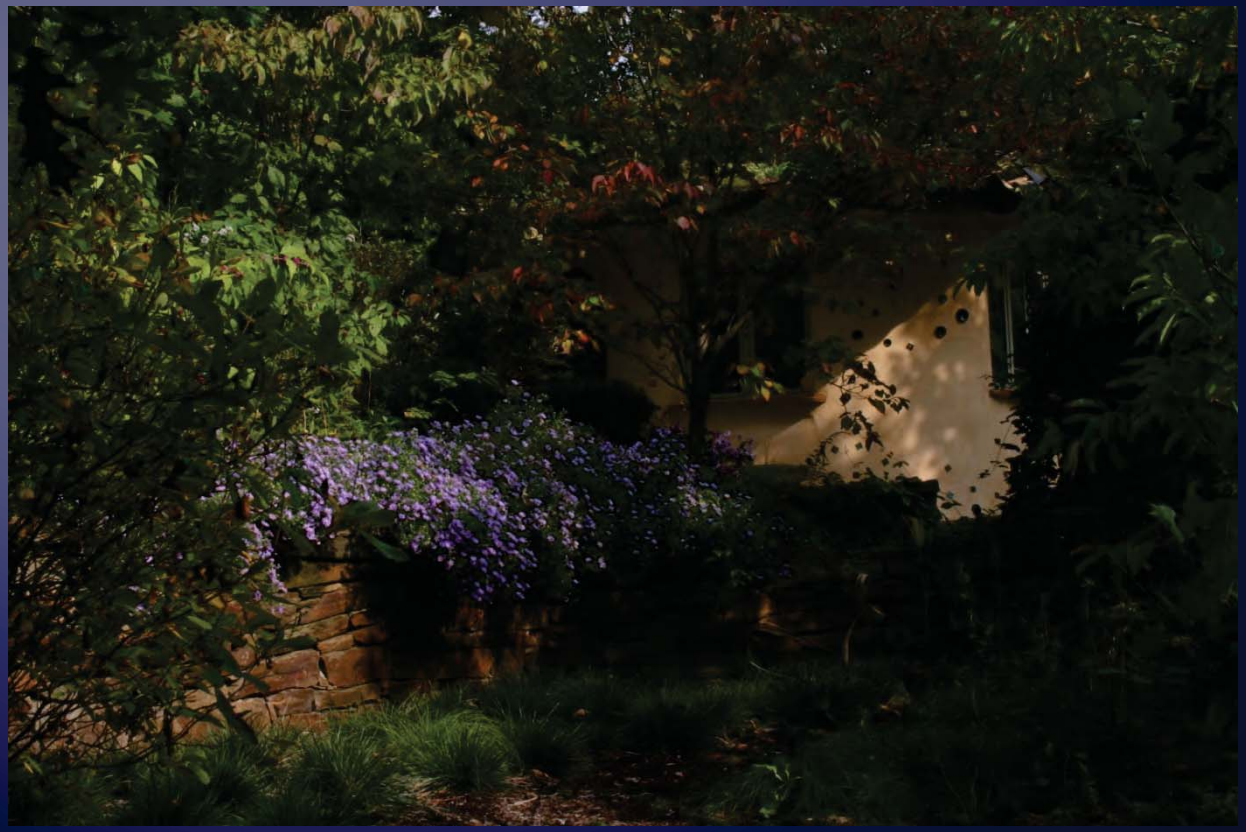
Getting Started
Project Objectives



- Efficient management of water resources
- Restoration of native plant communities
- Protect, build and restore top soil resources and health
- Use regionally sourced materials and products
- Design smart to minimize long-term management needs
- Preserve and enhance *Cultural and Significant Visual Resources* within Kennett Townships
- Create outdoor living spaces that bring pleasure, engagement and spiritually rejuvenate to all users

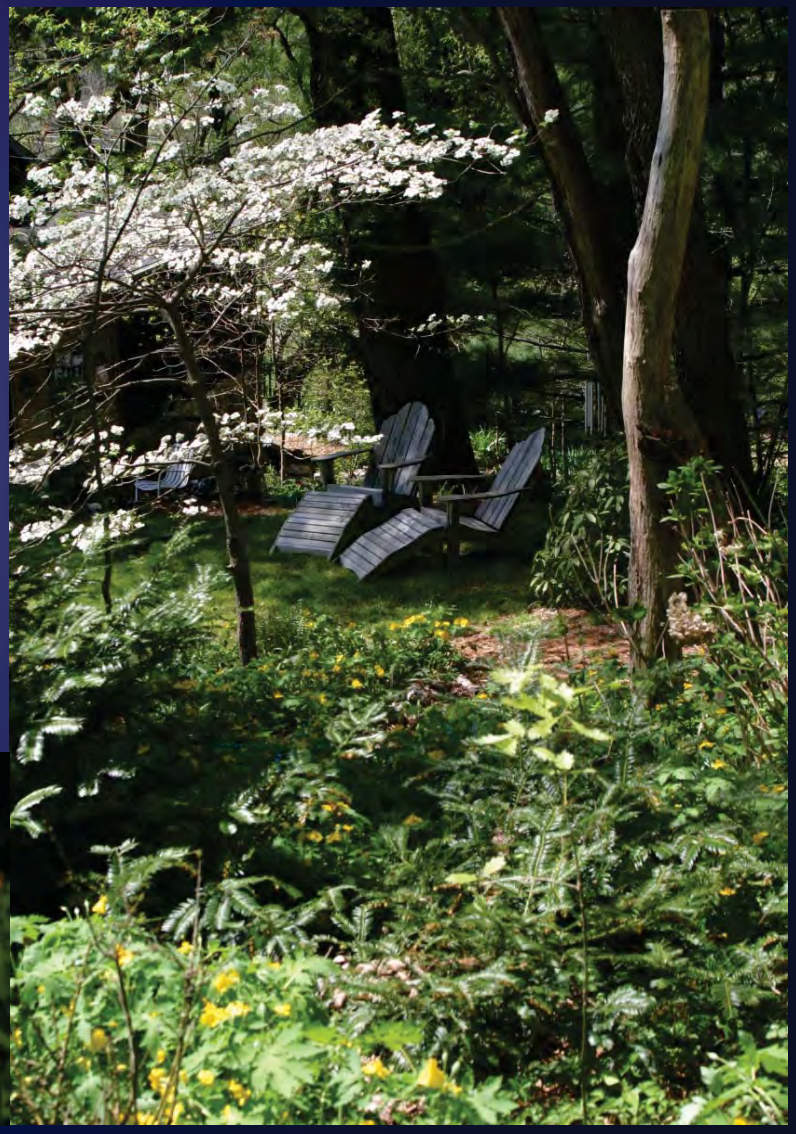
Getting Started

- Establish Point-of-Beginning for documentation as September 2009
- Complete compulsory charts and worksheets
- Assign tasks to team members
- Plan Design and Land Management Charrette dates
- Formulate project goals



Getting Started
History of property use

- Adjacent property served in 1700's as a Inn & Tavern, resources harvested?
- Mid 1800's-1950's, dairy farm operation, barn & pastures
- 1933 tenant farmer home built, principal dwelling
- 1950-1993 rental property
- From 1993-2013 Taylor's ownership



Getting Started

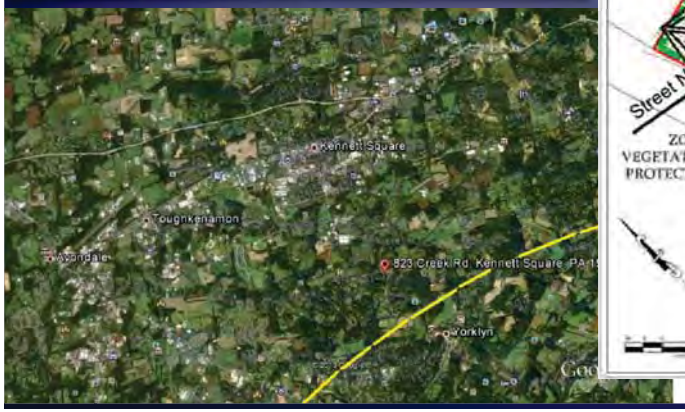
- Qualify as a “Greyfield for redevelopment”
  - Expanded acreage to include maintained road ROW 1.5-1.69 acres
  - Farmers timely gift of historic barn photo

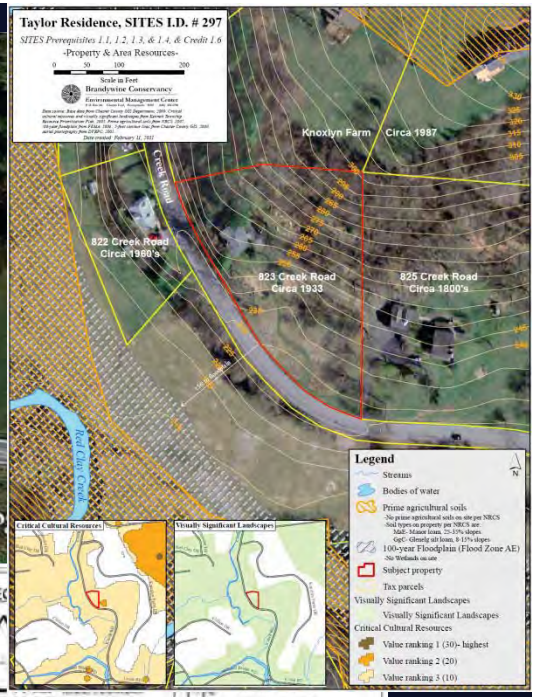
Site Design - selection/ Inventory

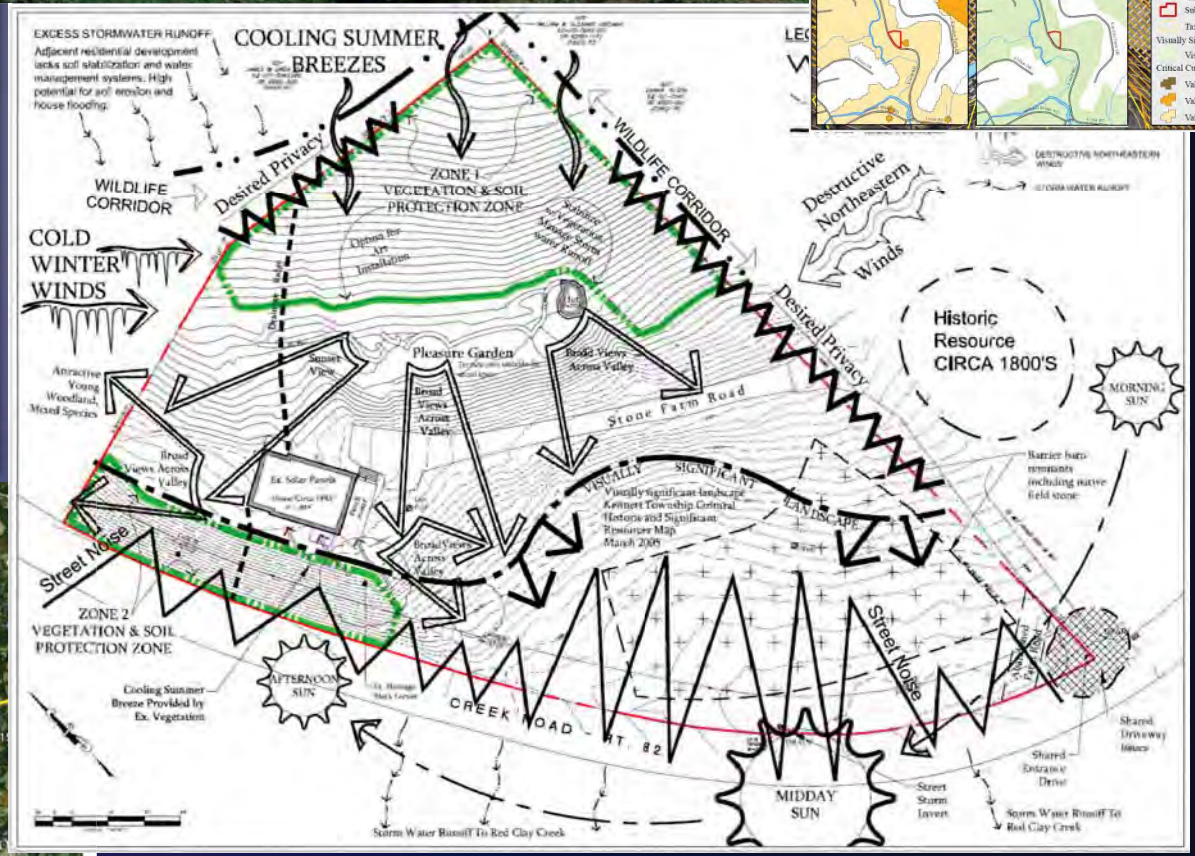
Select locations to preserve existing resources & repair damaged systems

Greyfields

Sites that encourage non-motorized transportation



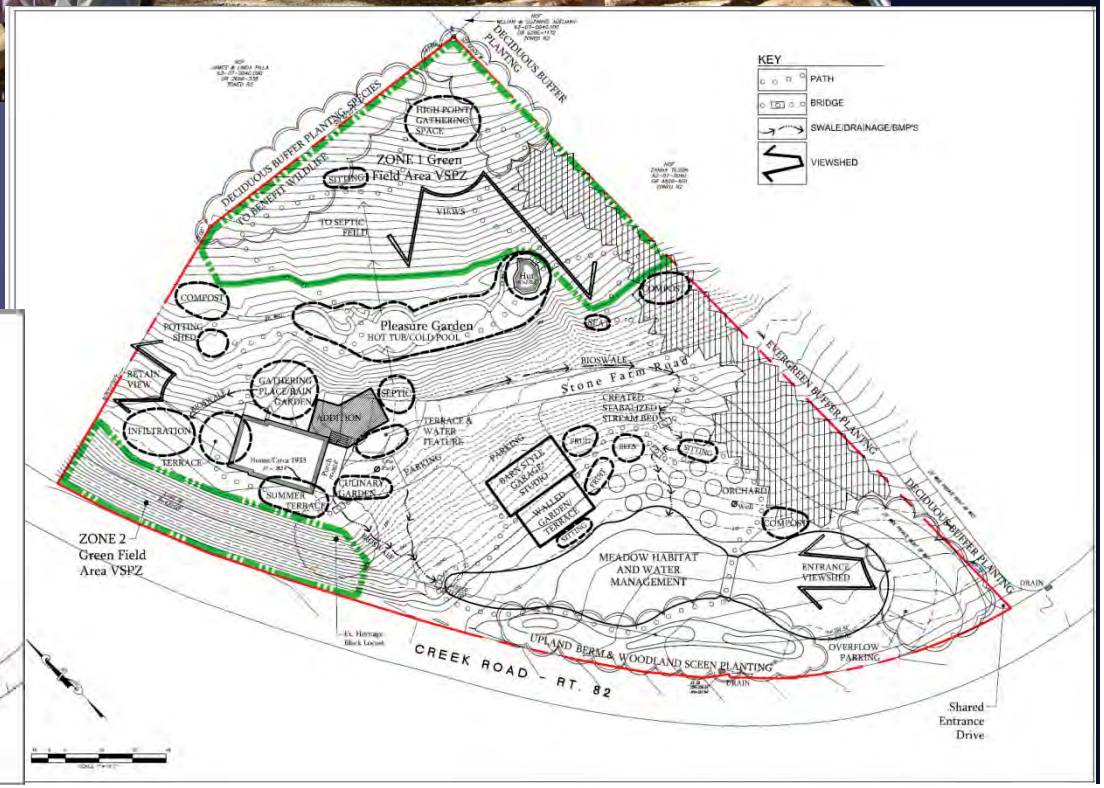




Site Design - Assessment & Planning

Plan for sustainability from onset of the project.

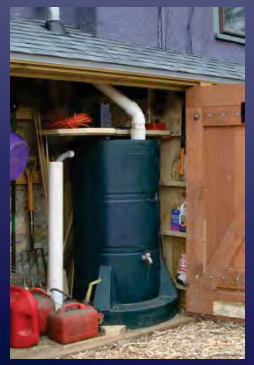
Site assessment and integrated site development process.

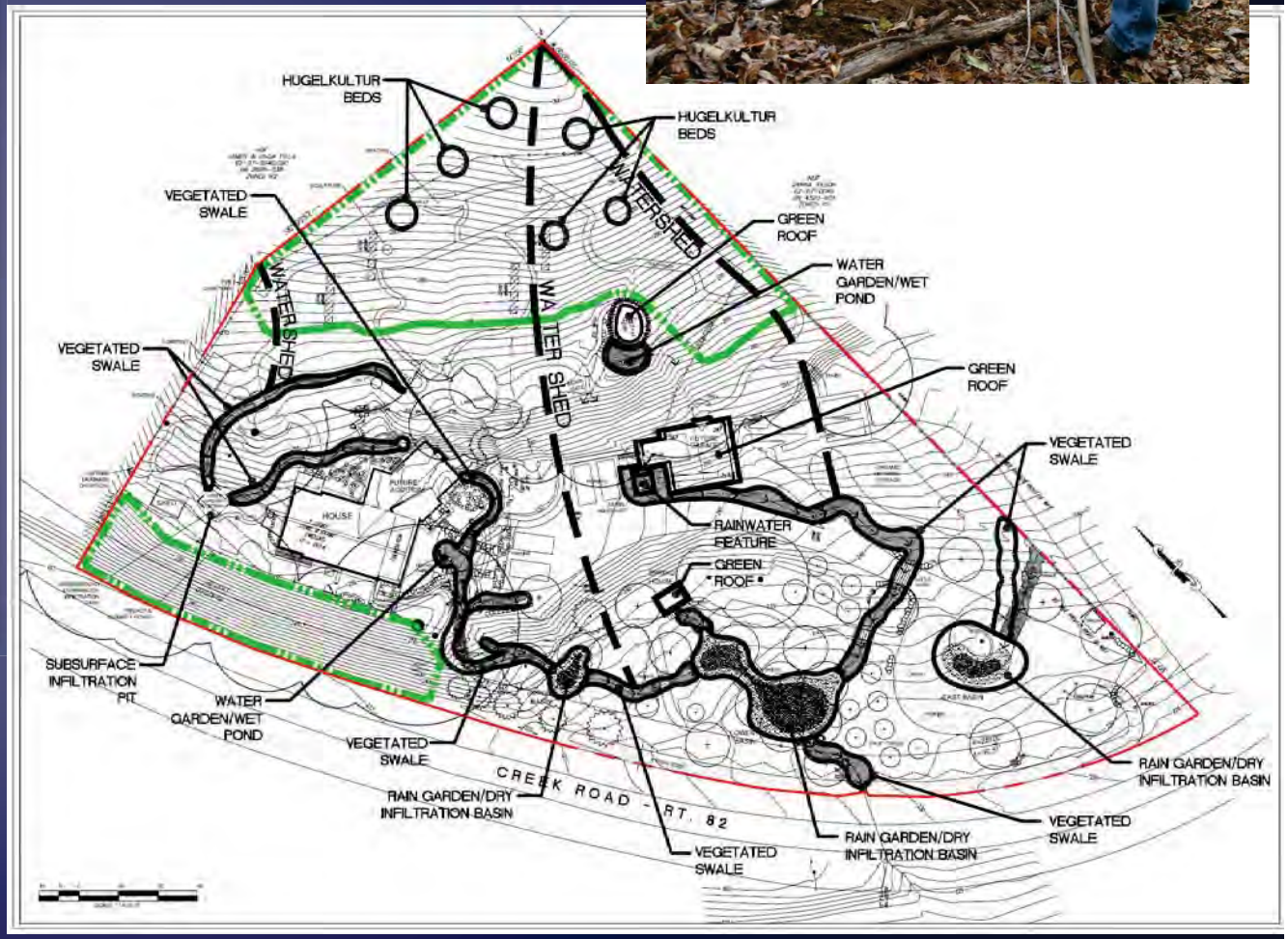


- Stormwater management system created across site.

Site Design - Water

Protect and restore processes and systems associated with a site's hydrology





Soil tests: highly erodible and compacted, need to balance soil biology, fungal vs. bacterial dominance.

Vegetation communities destroyed for farming practices.

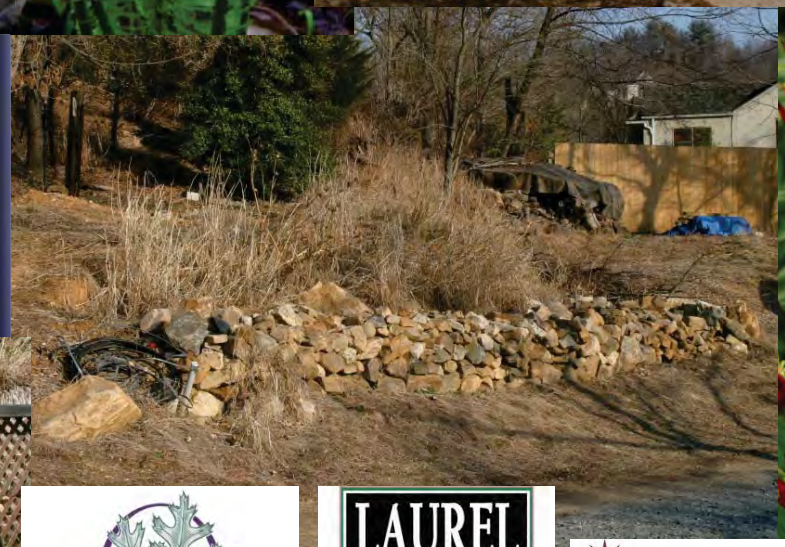
Site Design - Soil & Vegetation

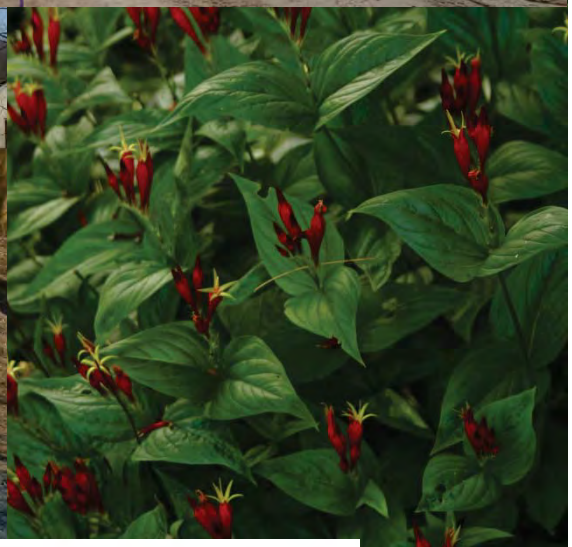
Protect and restore processes and systems associated with a site's soil and vegetation

- Shared driveway separated
- Excavated soil & stone from basement in reuse garden.
- Basement concrete under new driveway
- New septic system & holding tanks
- Tree logs form retention wall
- Plant rescue on & off-site
- Plant producers

Site Design - Materials Selection

Reuse/ recycle existing materials and support sustainable production practices





OCTORARO NATIVE PLANT NURSERY

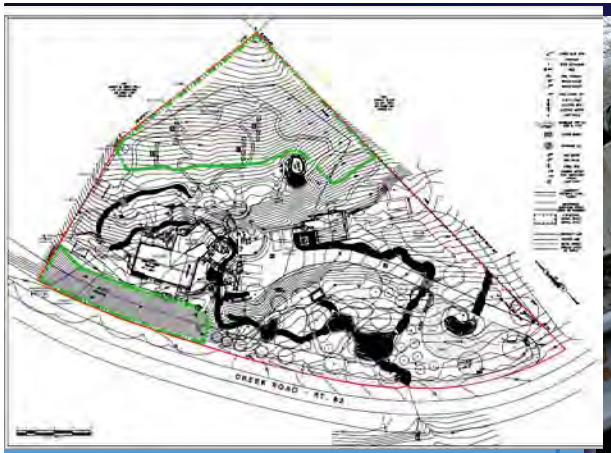
LAUREL VALLEY SOILS

NorthCreek NURSERIES
Where horticulture meets ecology.

Site Design – Human Health & Well-Being

Build strong communities and a sense of stewardship.

Considerations: seating areas, social interaction, reduced light pollution, educational elements, physical activity , cultural places, and spiritual rejuvenation



Construction

Minimize effects of construction-related activities

Contractors agreement, SVPZ, special vegetation, equitable income, local owned and operated businesses

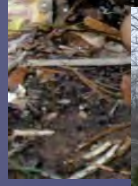
Taylor Residence I.D. # 297

Baseline Soil Tests: Measurement units were converted for comparison with Reference Site by Russ Leach

Sample Site	Volume (cc)	Weight (gm)	Bulk Density (gm/cc)	Total Porosity	CEC	pH	Organic Matter	P	K	Mg	Ca	Total Nitrogen	Soil Texture: Sand	Silt	Clay
Garden/ Hilltop	347.5	404.62	0.96	64.33%	14.1	6.6	4.7	120	2.9	99	62.7	0.37%	32%	45%	23%
Meadow	347.5	465.99	1.16	55.59%	15	5.9	5.3	156	3.9	14.5	59	0.31%	28%	37%	35%
Old Road	347.5	521.24	1.50	43.40%	19	6.5	4.5	213	0.55	3.15	11.38	0.44%	69%	20%	11%
Reference Site			0.80	69.90%	33.5		5.9		0.8	1.8	3.7	0.30%			

Soil Food Web

Sample Site	Sample Dry Weight	Active Bacteria	Total Bacteria	Active Fungi	Total Fungi	Protozoa Flagellates	Protozoa Amoebae	Protozoa Ciliates	Total Nematodes	Total Fungi to Total Bacteria	Active to Total Fungi	Active to Total Bacteria	Active Fungi to Active Bacteria	Plant Available N Supply (lbs/ac)	Actino Bacteria
Garden/ Hilltop	0.72	64.3	640	5.37	360	7991	7991	60	2.15	0.57	0.01	0.08	0.09	75-100	2.65
Meadow	0.82	112	806	16.8	867	8220	8220	627	1.96	0.7	0.03	0.14	0.15	75-100	10.9
Old Road	0.7	59.4	1262	22.3	730	6667	20091	401	7.36	0.58	0.03	0.06	0.38	100-150	8.3



Operations & Maintenance

Maintain the site for long-term sustainability

Monitoring and Innovation

Reward exceptional performance and improve the body of knowledge on long-term sustainability

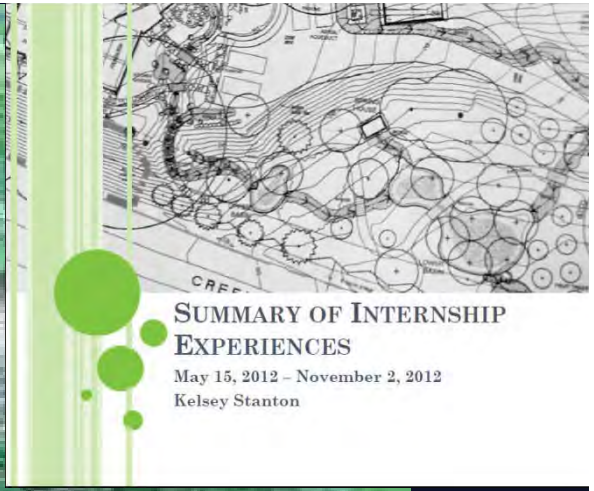
Monitoring Protocols

Soil Health,
Vegetative Community Quality,
Water Management,
Summary report on findings per above.

- Maintenance Log
- Annual soil tests in spring
- Annual review of vegetation in September with reference site stakeholders
- Photo recordation of plant communities development and invasive plant removal.
- Annual inspection of stormwater system/ devices in spring with engineers.
- Monthly photo recordation of projects stormwater management system.
- Publish summary report end of 2-year monitoring period, June 2014, highlighting soils, vegetation, and stormwater management performance.

Innovation

Internship credit – drafted credit 9.2 and demonstrated how to complete it.



Coming Improvements 2013

- Front Entry Hardscape, retaining walls, walkways, patios, pond, rain garden, and fencing

Notable Sustainable site features

Drip irrigation septic system: Sensitive wastewater disposal while preserving hillside woodland vegetation.

Notable Sustainable site features

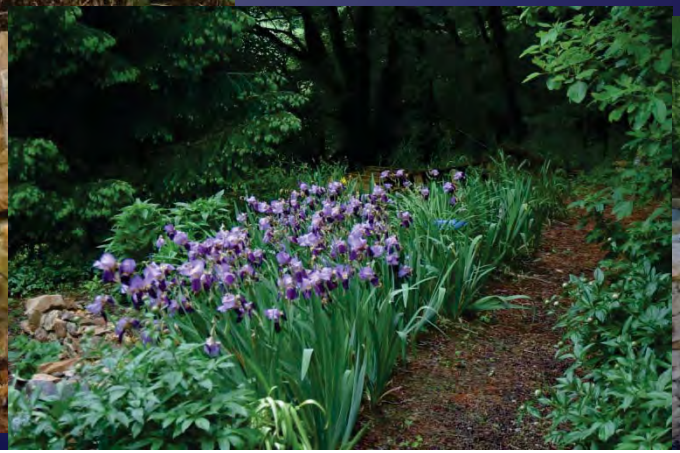
Green Roofs: Absorb rainwater and reduce speak storm water surge, and regulate seasonal temperatures in structure.

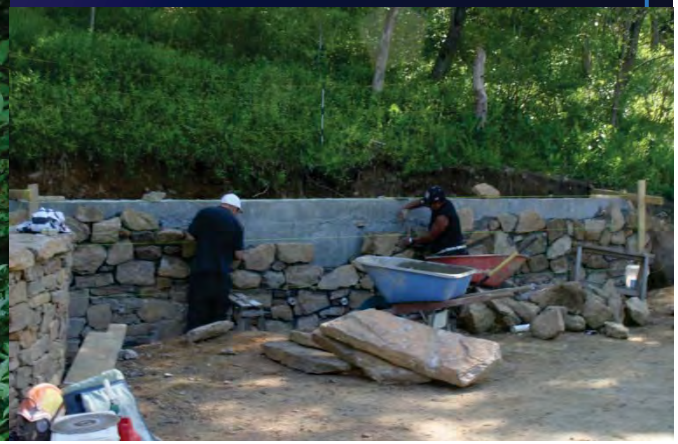
Notable Sustainable site features

Rescue Garden: Excavation and construction materials on this property were creatively reused rather than being sent to a landfill.

Twenty-five tons of stone found new life as steps, terraces, roadways, and retaining walls, and excavated soils were used to create ramps and planting beds.

The porch's timbers were adapted to construct a one-of-a-kind potting shed.



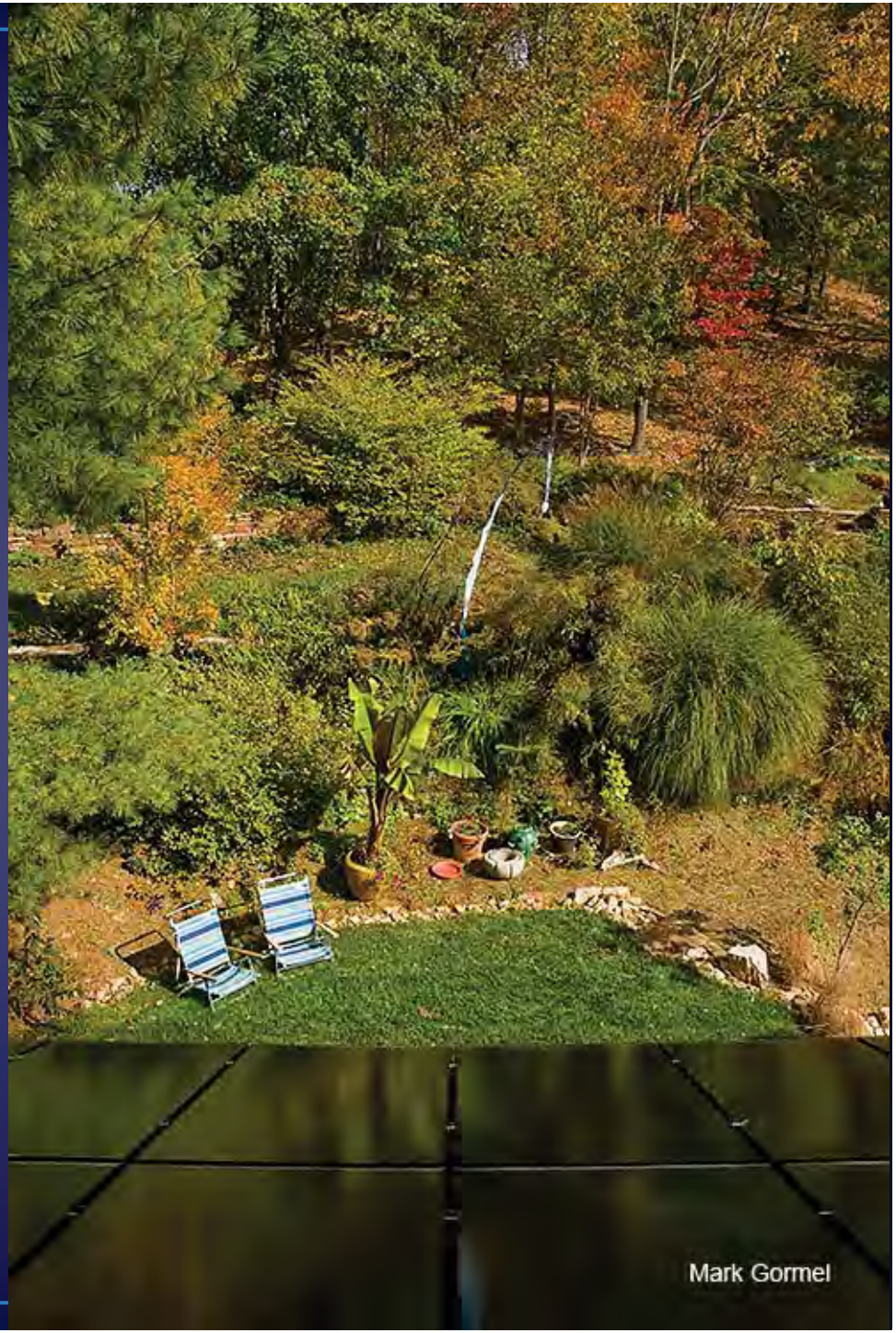


Notable Sustainable site features

- Stormwater system conveyances and BMP's that model nature: Direct and control storm water flow, recharge ground water, reduce peak stormwater surge, create aesthetic landscape features, and lower meadow rain garden habitat.

Challenges

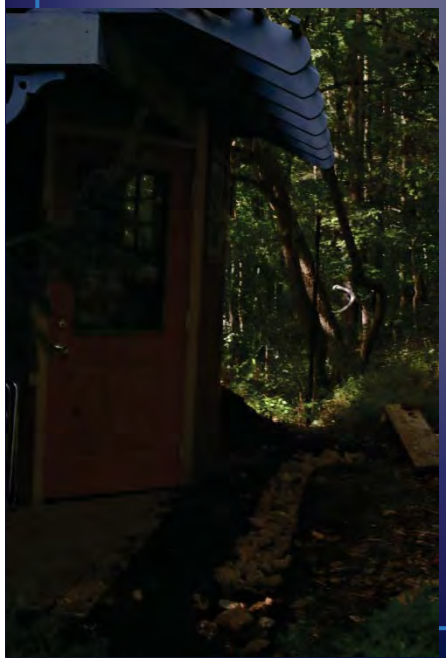
The historic farm use of the site stripped its native vegetative communities and lowland top soils, and left highly eroded and compacted soils. This developed into opportunities to rebuild soil health and native plant communities appropriate for different zones throughout site.



Challenges

When the farming operation ended debris from farm structures was buried on-site.

- Debris was found during driveway reconstruction and contained concrete, ceramic tiles and building grade stone.
- Materials have been repurposed into stone walls, structural road support, drainage ways, creative landscape amenities and follies.



Challenges

The 8-15% grade for the site posed challenges for water management and improvement locations.

Developed into opportunities for creative water management techniques that directed, captured, slowed and played with stormwater runoff.

Challenges

- Property to serve as a demonstration site.
  - Issue: It became important to consider accessibility to garden areas for visitors of limited mobility and groups of varying sizes.
  - Solution: A pathway and signage system was designed for multiple ability user access and to serve wayfinding needs, and drawn up on a map.

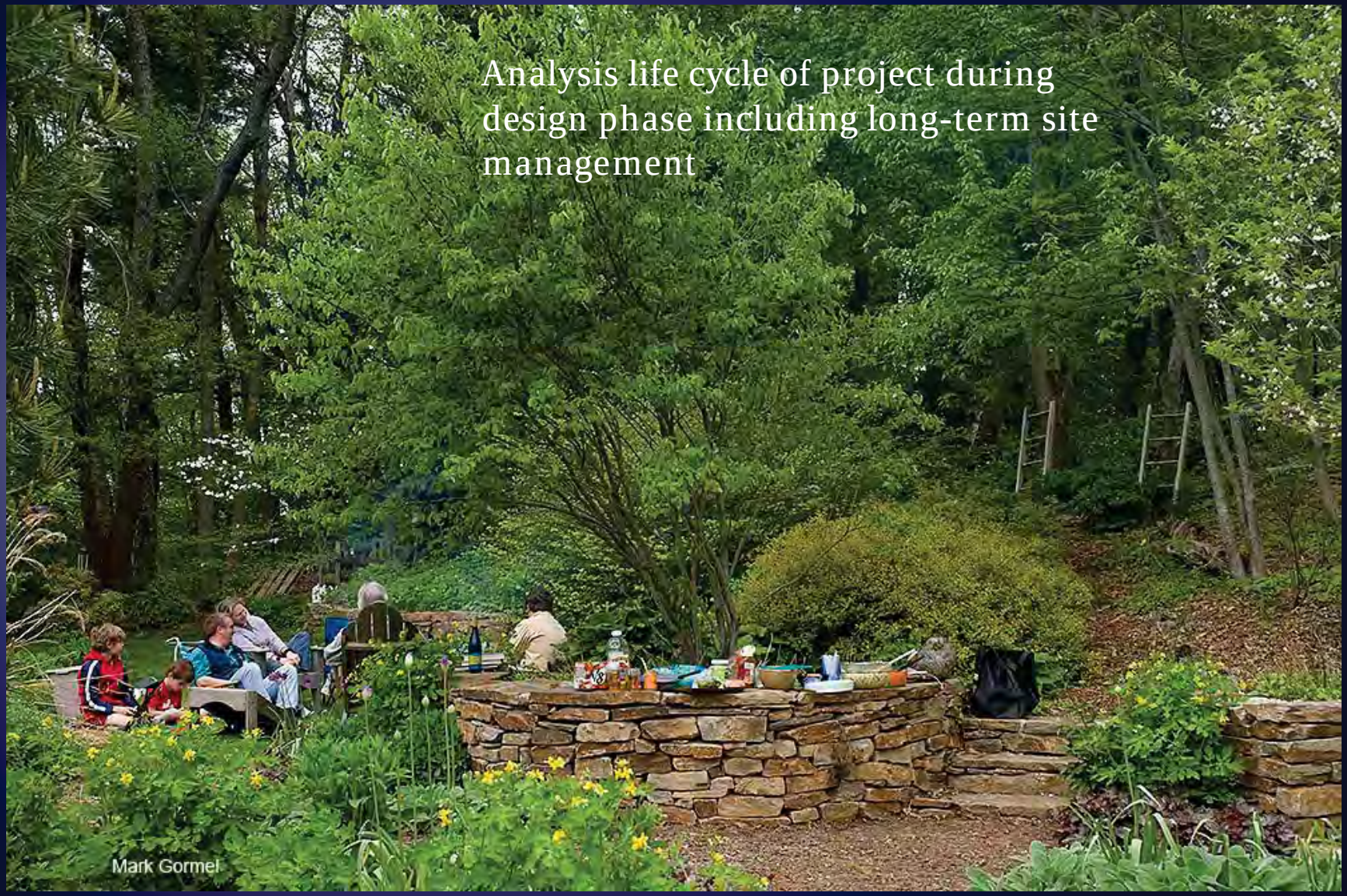
Challenges
Educational Elements

Lessons Learned

Integrative Design Team focus on water and soil resource management lead design responses.

A 5" or 100-year rainstorm in December 2012 demonstrated the appropriate and adequate design and placement of all stormwater devices. For the first time since 1993, there were no signs of soil erosion on-site after hurricane Sandy.

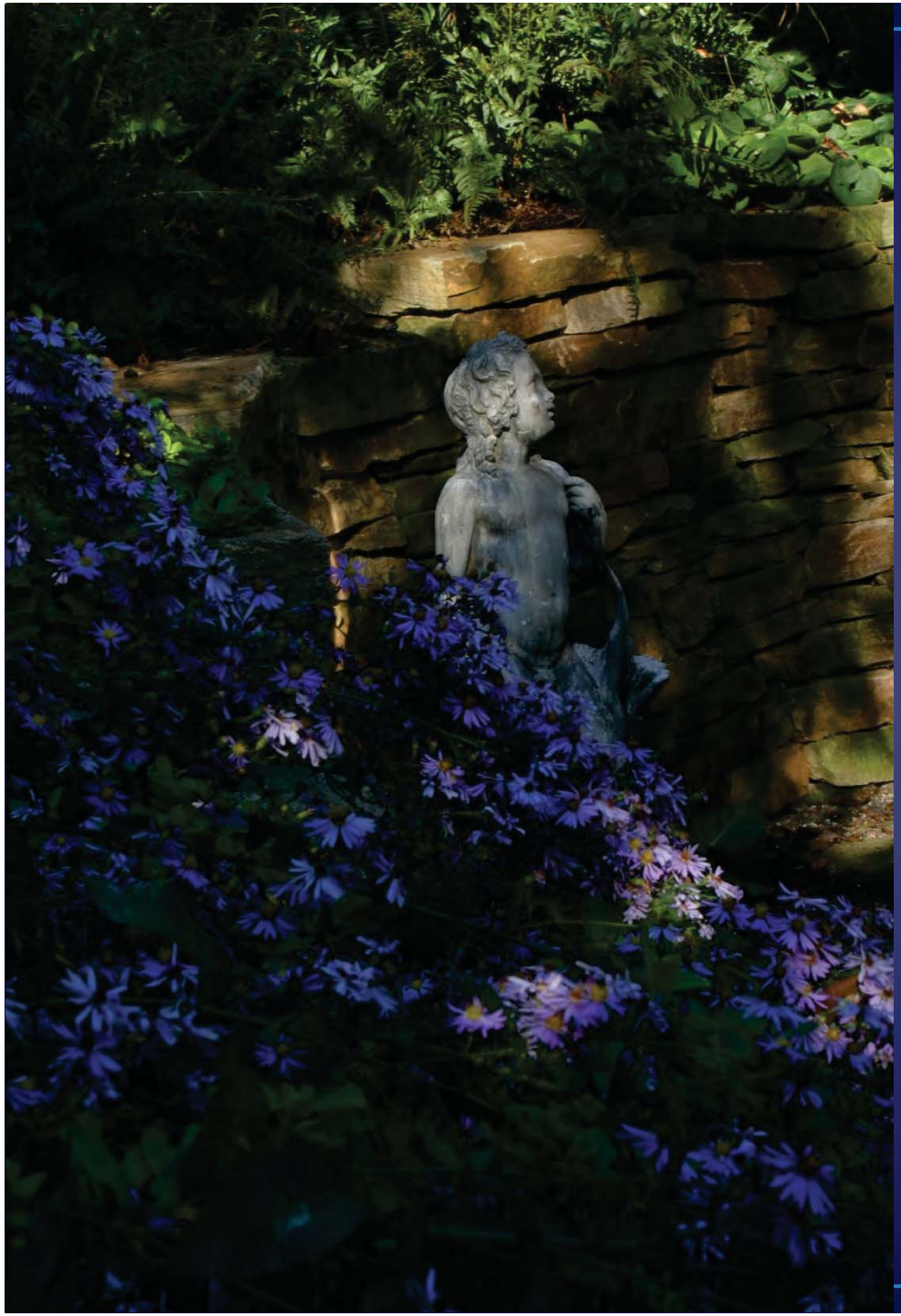
Lessons Learned



Land managers contributions to design and site management

Lessons Learned

Since project commenced before SITES Pilot, some decisions needed to change to align with SITES standards



Lessons Learned

Project success due to the contractors, suppliers, stakeholders, and Design Team's flexibility, willingness to change in mid-stream, and timely humor.

Lessons Learned
Project influence on future projects

- Broader perspective through a integrated design team
- The need to plan site management and select site materials and suppliers up front

March 5, 2013 Achieved 3 Star Certification

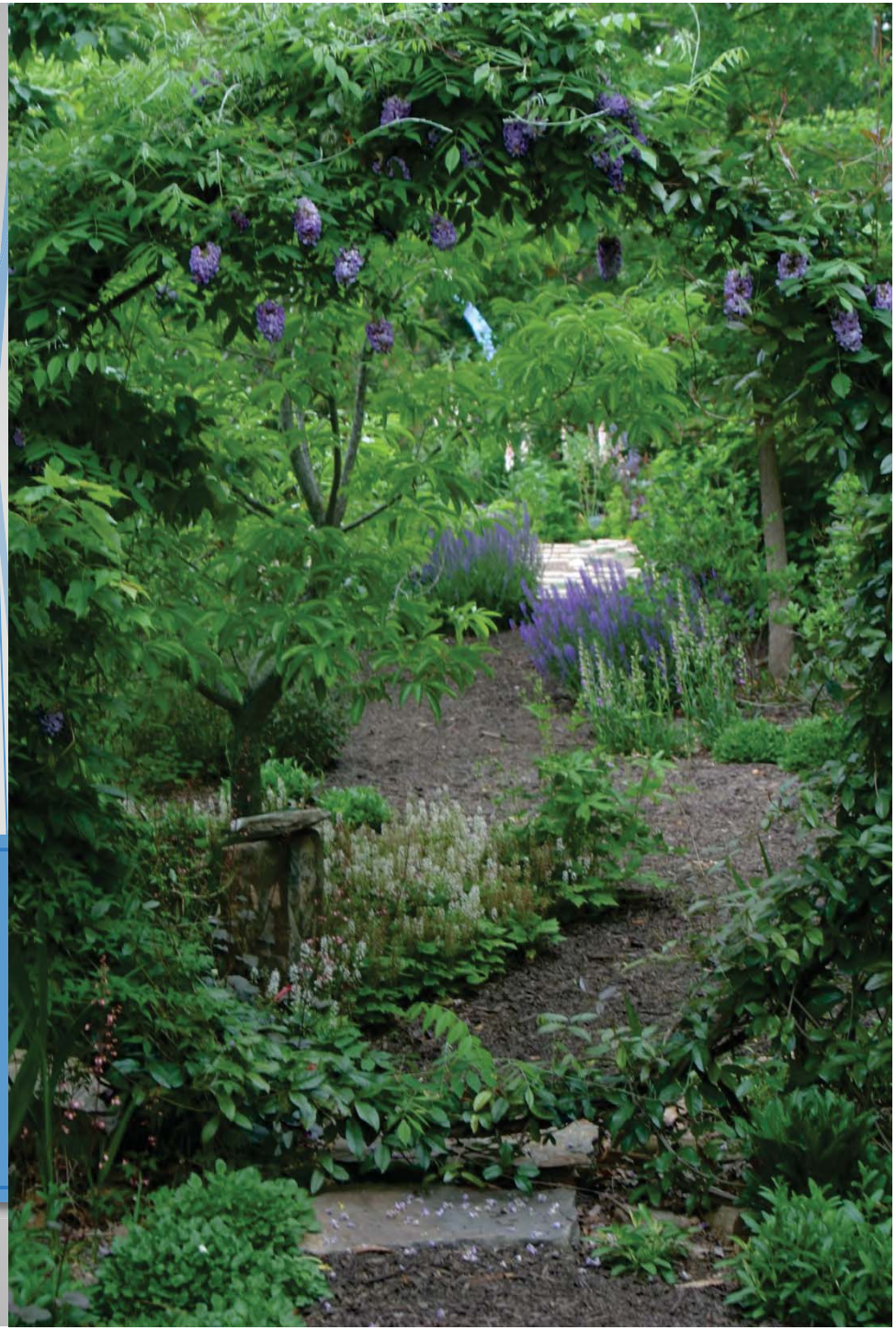
1st certified residence east coast

2013 SITES CERTIFIED

SUSTAINABLE SITES INITIATIVE™

Special Invitation Private Site Tour

Friday April 26, 2013 at 10 AM



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