The Science and Practice of Sustainable Sites: Watering without Waste
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October 4, 2011

Sustainable Sites Initiative Schedule

1. Guidelines and Performance Benchmarks 2009
   Released November 2009
2. Pilot Phase
   June 2010 – June 2012
3. Reference Guide
   Target publication: 2012
4. Open Enrollment
   2013

Presentation Topics

- Overview of SITES with respect to landscape irrigation design, planning and maintenance practices
- Review of SITES irrigation prerequisites and credits
- Comparison of LEED 2009 with Sustainable Sites Initiative
- Design considerations
- Methods for achieving the SITES credits
- Supportive irrigation technologies, resources and materials
- SITES pilot project example

SITES Options

Options for SITES tool
Goal: Widest Possible Use of SITES Guidelines & Performance Benchmarks

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Rating System

- 250 point scale
- Recognize % of attainment
- Multiple point levels for many credits
- 4 levels of certification
  Prerequisites plus:
  ★ = 100 points (40%)
  ★★ = 125 points (50%)
  ★★★ = 150 points (60%)
  ★★★★ = 200 points (80%)

Guidelines & Performance Benchmarks 2009

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

Credit Categories

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

Overview of SITES

Requires a Holistic Pre-Design Assessment and Planning Approach

- Prerequisite 2.1: Pre-design site assessment. Explore opportunities for sustainability with the integrated design team.
- Prerequisite 2.2: Integrated and collaborative site development process.
- Credit 2.3: Engage users and stakeholders in site design (4 points)
Overview of SITES

Prerequisites 2.1 and 2.2 and Credit 2.3 gets everyone involved in a project’s initial planning, goal setting and discussions at the start of preliminary/conceptual design. This includes:

- Owner/Developer
- Prime design consultant
- Subconsultants
- Agency and Permitting personnel
- Facilities personnel
- Maintenance and Operations personnel
- Adjacent property owners
- Interested public and community members

Comparison of LEED 2009 and SITES

**LEED 2009**

WE Prerequisite 1: Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation).

WE Credit 1:
- Option 1: 50% reduction
  - 2 points: Reduce potable water consumption for irrigation by 50% from a calculated baseline
- Option 2: No potable water use or no irrigation
  - 4 points: Use only captured rainwater, recycled wastewater, recycled graywater or other approved non-potable sources
  - No irrigation or no permanent irrigation (a temporary system installed for plant establishment is allowed if removed within 1 year of installation)

**SITES**

Prerequisite 3.1: Reduce potable water use for landscape irrigation by 30% from established baseline.

Credit 3.2: Reduce potable water use for landscape irrigation by 50% or more from established baseline (2 to 5 points)
- 2 points: 51% reduction in water use
- 3 points: 75% reduction in water use
- 4 points*: No potable water used beyond plant establishment
- 5 points: No potable water used after or during plant establishment

* = change in credit during pilot program

Design Considerations

Landscape and irrigation design, types and materials need to have agreed upon goals and “buy in” from multiple stakeholders at the onset of design work:

- Appearance (turf grass areas, ornamental plantings, drought tolerant and native plants, density and massing of shrubs and groundcovers)
- Compliance with agency landscape codes
- Soil preparation procedures, including protection and/or stockpiling for reuse of existing on-site native topsoil, scarification of compacted subgrades, depths of imported soil amendments and topsoil
- Mulch type and depth
- Irrigation methods (drip, fixed spray, rotors), circuiting (lawn, beds, trees, microclimates), and operation for plant establishment versus long term
- Milestones for reductions in irrigation being applied after plant establishment
- Planned shut-downs of targeted irrigation circuits
3. Site Design—Water

Product and restore processes and systems associated with a site’s hydrology

**Prerequisite 3.1:** Reduce potable water use for landscape irrigation by 30 percent from established baseline

**Credit 3.2:** Reduce potable water use for landscape irrigation by 50 percent from established baseline

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**THE SUSTAINABLE SITES INITIATIVE**

**Project Schedule**

1. **Guidelines and Performance Benchmarks 2009**
   - Released November 2009
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**THE SUSTAINABLE SITES INITIATIVE**

**The Sustainable Sites Initiative**

**Part 1: Baseline Landscape Water Requirement (BLWR)**

Determine the BLWR for a site in your region by entering the site landscape data into the online calculator. Note that the sum of the four BLWRs must exceed the total area of the irrigated landscape entered in Part 1 of the calculator. The calculations for BLWR are based on the U.S. Environmental Protection Agency WaterSense Water Budget Tool's equation for Landscape Water Allowance (May 2009 revision).

\[ BLWR = E_T + C_R \]

Where:

- \( E_T \) = measured or reference evapotranspiration (ET) for the site (s庇 using weather normalized potential ET)
- \( C_R \) = constant or coefficient for type of plant (e.g., grass, shrub)

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**THE SUSTAINABLE SITES INITIATIVE**

**Irrigation Calculations**

- **Part 2: Designed Landscape Water Requirement (DLWR)**
- **Part 3: Calculated Landscape Water Requirement (CLWR)**
- **Part 4: Estimated Landscape Water Requirement (ELWR)**

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Design Considerations - Recap

Landscape and irrigation design, types and materials need to have agreed upon goals and "buy in" from multiple stakeholders at the onset of design work:

- Appearance
- Compliance landscape codes
- Soil preparation
- Mulch type and depth
- Irrigation methods and purpose
- Milestones for reductions after plant establishment
- Planned shut-downs

Achieving the SITES Credits

- Landscape and irrigation techniques work together
- Hydrozones........for real.
  - Group plants based on water demand
  - Lawn areas; size and location
- Meeting Prerequisite (3.1) requires adjustments
- Meeting Credit (3.2) requires commitment
  - 2 points: reduce to 51% of baseline
  - 3 points: reduce to 75% of baseline
  - 4 points: no potable water beyond establishment
  - 5 points: no potable water ever

Designed Landscape Water Requirement

SITES Formula

\[ DLWRH = RTM \times [(ET0 \times KL) - Ra] \times A \times Cu \]

Where:
- RTM = Run time multiplier (DU)
- ET0 = Avg. Evapotranspiration (historical)
- KL = Landscape Coefficient (from chart)
- Ra = Allowable rainfall (25% of peak month)
- A = Hydrozone area (SF)
- Cu = Conversion factor (inches to gallons)

Data Sources

Evapotranspiration Rates

- Seattle Area – Irrigation Water Management Society
- Nationwide – Rainmaster; National Climatic Data Center
- Local irrigation groups or agricultural colleges
- Can be difficult to locate; May need to search or pay fee

Rainfall Data

- Seattle Area – Irrigation Water Management Society
- National or Western Regional Climate Center; NOAA
**Non-Potable Water Sources**

- Rainwater – minimal regulations, low hanging fruit
- Greywater – treatment required, subsurface drip only
- Reclaimed water – different classes allow different uses

**Air Conditioner Condensate**

**Not Eligible**
- Surface waters, lakes, rivers, ponds
- Subsurface groundwater, wells

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**Irrigation: Temporary or Permanent**

**To install or not to install? That is the Question.**

- Parks, Fields, and highly visible areas.
- Rain gardens, native areas, open pasture
- Drought tolerant plantings
- Client / owner coordination

**What is temporary irrigation?**

- Placed at finish grade; pipe, heads, valves, etc....
- Practicality is limited
- Aesthetic, liability, and functionality concerns

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**Designed Landscape Water Requirement**

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Kc Low</th>
<th>Kc Medium</th>
<th>Kc High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Cover</td>
<td>0.2</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Shrubs</td>
<td>0.2</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Trees</td>
<td>0.2</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Turfgrass</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Note: The estimated Kc values in Table 1 are taken from the U.S. EPA WaterSense Water Budget Tool (May 2009 revision).*

<table>
<thead>
<tr>
<th>Irrigation Type</th>
<th>DU400 or EU*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drip - Standard</td>
<td>70%</td>
</tr>
<tr>
<td>Drip - Press Comp</td>
<td>90%</td>
</tr>
<tr>
<td>Flood Spray</td>
<td>65%</td>
</tr>
<tr>
<td>Micro Sprinkler</td>
<td>70%</td>
</tr>
<tr>
<td>Rotor</td>
<td>70%</td>
</tr>
</tbody>
</table>


DU400 distribution uniformity (DU) applies to sprinkler zones, and emission uniformity (EU) applies to drip/micro-irrigation zones.
Irrigation: Temporary or Permanent

Establishment Phase in SITES
• Prerequisite 3.1 – 30% after establishment phase
• Credit 3.2 – before and after depending on point level
• Designated time period by SITES
  3 years for trees
  2 years for shrubs
  1 year for groundcover

Creates design and installation challenges
• Practicality of requirement?

Irrigation: Operations & Shut Off

After System Install
• Training on Irrigation Clock
• Training on Irrigation Maintenance
• Who gets trained?

Shut off after establishment
• Sequenced per hydrozones
• All at once

Sustainable Irrigation Materials

Water Conservation Materials
• Drip irrigation
• Weather based controllers
• Rotary sprinkler nozzles
• Flow sensors, moisture sensors, rain shut-off

Material Chemistry
• PVC – production and disposal concerns
• PVC alternatives – Polyethylene (PE pipe)
• SITES Credit 5.10 – Sustainable Materials Manufacturing
SITES PILOT PROJECT

Olympic College Student Parking Lot
Bremerton, Washington

Schacht | Aslani Architects
SvR Design Company
Tres West Engineers, Inc.
O'Brien & Company

Long-Range Development Plan

- College is committed to sustainable design
- College has signed the American College & University President’s Climate Commitment
- Master Plan introduces:
  - Central Campus Spine
  - Pedestrian focused
  - Building entry orientation
  - Community amenities
  - Improved vehicular and pedestrian circulation and parking capacity

Site Context

- 33 acre urban site
- Congested/limited parking
- Poor street configuration and circulation
- Inefficient smaller lots
- Overflow parking impacts adjacent residential areas
- Warren Ave. has one of the highest traffic volumes in city
- Untreated stormwater runoff flows directly into Port Washington Narrows

Site Plan

- ADA Accessible Routes of Travel
- Generous Perimeter & Interior Landscape Buffers
- Rain Gardens
- Pervious Concrete Pavements
- ADA Accessible Routes of Travel
- Rain Gardens
Prerequisite 3.1 Documentation

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Prerequisite 3.1 Documentation

Credit 3.2 Documentation

High Point Revitalization Project

- 120-acre mixed income housing redevelopment
- 34 blocks of new streets with new utilities, street trees, sidewalks, parks and open space
- 1,600 housing units, neighborhood center, library, and mixed-use block
- Density ranges from 16 units/acre to 30 units/acre of ground-related housing
High Point Streetscapes

- Concept
- Under Construction: Porous walks, curb cuts and swales
- After Construction

High Point Right-of-Way Swales

- Vegetated
- Grass-lined
- Conveyance
- Amended soils

For more information, please visit:  
www.sustainablesites.org  
or email  
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