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SvR DESIGN COMPANY

Civil Engineering
Landscape Architecture
Environmental Restoration
Planning

The Science and Practice of Sustainable Sites: Watering without Waste

Dave Hilgers – R Miller, Inc.
Matt Suhadolnik – SvR Design Company

October 4, 2011

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

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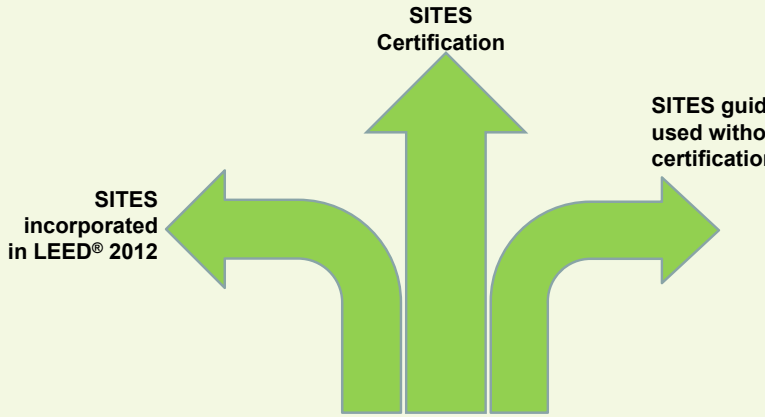
Sustainable Sites Initiative Schedule

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

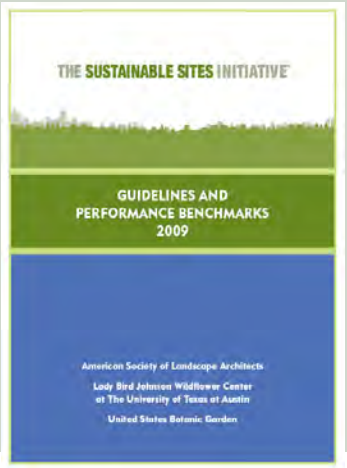
SITES Options



Options for SITES tool

Goal: Widest Possible Use of SITES Guidelines & Performance Benchmarks

Rating System

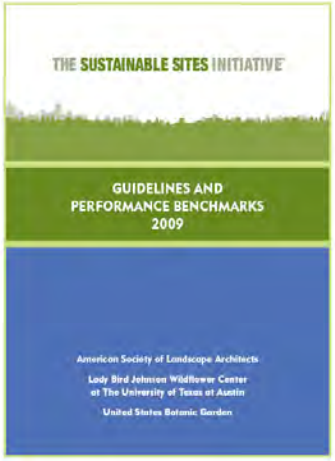


- **250 point scale**
- **Recognize % of attainment**
- **Multiple point levels for many credits**
- **4 levels of certification**

Prerequisites plus:

★ = 100 points (40%)
★★ = 125 points (50%)
★★★ = 150 points (60%)
★★★★ = 200 points (80%)

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

Guidelines & Performance Benchmarks 2009

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

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)**

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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

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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.

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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 case
- 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

    or

    No irrigation or no permanent irrigation (a temporary system installed for plant establishment is allowed if removed within 1 year of installation)

http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1447

SITES

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

- Applies only to long-term water use
- *Exempt* from irrigation calculations:

❖Water used during establishment phase
❖Water used to irrigation non-commercial food production gardens

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 during or after plant establishment.

* = change in credit during pilot program

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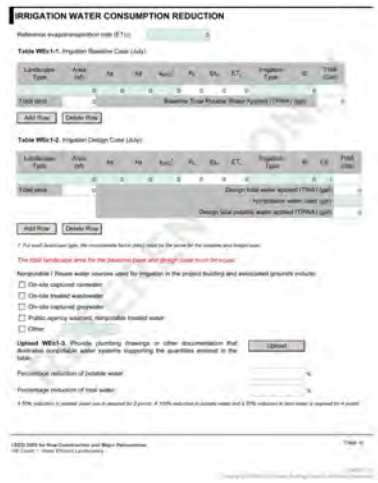
LEED WE Credit 1 Documentation



LEED

Table WEc1-1. Irrigation Baseline Case (July)

Landscape Type	Area (sf)	ks	kd	kmc[1]	K_L	Et_o	ET_L	Irrigation Type	IE	TWA (Gal)
	0	0	0	0	0		0	-	0	
Total area	0				Baseline Total Potable Water Applied (TPWA) (gal)					0

Add Row | Delete Row

THE SUSTAINABLE SITES INITIATIVE™

Part 1: BASELINE LANDSCAPE WATER REQUIREMENT			
ET_0 (inches/month)	A (square feet)	Cu	BLWR (gallons/month)
		0.6233	

LEED

Baseline Case Table

Landscape Type	Area (sf)	Species Factor	Density Factor	Microclimate Factor	K_L	ET_L	IE		TPWA (gal)
Eastlake Ave Trees	170	average	0.5	average 1.0	average 1.0	0.5	2.25	Sprinkler	0.625	612
Blaine St Beds	3,215	high	0.9	high 1.3	low 0.5	0.6	2.63	Sprinkler	0.625	13,542
Fairview Ave Beds	565	average	0.5	average 1.1	high 1.4	0.8	3.47	Sprinkler	0.625	3,122
Upper green roof extensive	14,645	low	0.2	high 1.1	high 1.4	0.3	1.39	Drip	0.900	22,553
Lower green roof extensive	8,705	average	0.5	high 1.3	high 1.4	0.9	4.10	Sprinkler	0.625	57,035
Lower green roof intensive	3,690	high	0.9	high 1.3	high 1.4	1.8	7.37	Sprinkler	0.625	91,726
Total	29,990								Net GPWA (gal)	120,590

THE SUSTAINABLE SITES INITIATIVE™

Part 1: BASELINE LANDSCAPE WATER REQUIREMENT			
ET_0 (inches/month)	A (square feet)	Cu	BLWR (gallons/month)
4	10,000	0.6233	24,932

LEED

Design Case Table

Landscape Type	Area (sf)	Species Factor	Density Factor	Microclimate Factor	K_L	ET_L	IE		TPWA (gal)
Eastlake Ave Trees	170	average	0.5	average 1.0	average 1.0	0.5	2.25	Drip	0.900	425
Blaine St Beds	3,215	high	0.9	high 1.3	low 0.5	0.6	2.63	Drip	0.900	6,404
Fairview Ave Beds	565	average	0.5	average 1.1	high 1.4	0.8	3.47	Drip	0.900	2,175
Upper green roof extensive	14,645	low	0.2	high 1.1	high 1.4	0.3	1.39	Drip	0.900	22,553
Lower green roof extensive	8,705	low	0.2	high 1.3	high 1.4	0.4	1.64	Drip	0.900	15,643
Lower green roof intensive	3,690	average	0.5	high 1.3	high 1.4	0.9	4.10	Drip	0.900	12,240
Total	29,990								Subtotal (gal)	62,640
									July Graywater Harvest (gal)	
									Net GPWA (gal)	62,640

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Part 2: DESIGNED LANDSCAPE WATER REQUIREMENT				
ET_0 = Average monthly reference evapotranspiration for the site's peak watering month (inches/month) as entered in Part 1		R_e = Allowable rainfall = 25% of average monthly rainfall for the site's peak watering month (inches/month)		
4		2		
Area of hydrozone (square feet)*	Plant type within hydrozone	K_L = Landscape coefficient**	Distribution uniformity*** (enter fraction %, i.e. 80% = 80)	Landscape water requirement (gallons/month)
5,000	Trees	0.5	0.75	6,233
5,000	Turfgrass	0.7	0.75	9,557
Designed Landscape Water Requirement (gallons/month)				15,790

LEED

WE Credit 1: Water Efficient Landscaping

EvapotranspirationTable

ET_0	
July	4.50

Baseline Case Table

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Total	29,990								Subtotal (gal)	62,640
									July Graywater Harvest (gal)	
									Net GPWA (gal)	62,640

Irrigation Potable Water Use Reduction	51%

3. Site Design—Water

Protect 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 or more from established baseline (2–5 points)

Prerequisite 3.1 REQUIRED	Reduce potable water use for landscapes irrigation by 30 percent from established baseline

Intent

Reduce the use of potable water, natural surface water (such as lakes, rivers, and streams), and groundwater withdrawals for landscape irrigation after plant establishment.

Credit 3.2 2-5 points	Reduce potable water use for landscapes irrigation by 50 percent from established baseline

Intent

Limit or eliminate the use of potable water, natural surface water (such as lakes, rivers, and streams), and groundwater withdrawals for landscape irrigation. Encourage alternative irrigation methods and water conservation strategies.

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Irrigation calculator[36]

Part 1: Baseline Landscape Water Requirement (BLWR)

Determine the BLWR for a site in your region by entering the site landscape information into the white cells of the worksheet below (sample data shown here). The calculations for BLWR are adapted from the U.S. Environmental Protection Agency WaterSense Water Budget Tool's equation for Landscape Water Allowance (May 2009 revision, *http://www.epa.gov/watersense/specs/homes.htm#tool*).

$$BLWR = ET_0 \times A \times C_u$$

Where:

ET_0 = average reference evapotranspiration (ET_0) for the site's peak watering month, as provided locally (inches/month)

A = Area of irrigated landscape in square feet (area designed with permanent irrigation systems)

C_u = Conversion factor (0.6233 for results in gallons/month)

Part 1: BASELINE LANDSCAPE WATER REQUIREMENT			
ET_0 (inches/month)	A (square feet)	C_u	BLWR (gallons/month)
4	10,000	0.6233	24,932

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Part 2: Designed Landscape Water Requirement (DLWR)

Determine the DLWR for the actual site by entering the average monthly precipitation (inches/month) for the site's peak watering month, the area of each hydrozone (in square feet), and the plant type, landscape coefficient, and distribution uniformity for each hydrozone in Part 2 of the Irrigation Calculator (sample data shown here). Note that the sum of the hydrozone areas must equal the total area of the irrigated landscape entered in Part 1 of the calculator. The calculations for DLWR are revised from the U.S. Environmental Protection Agency WaterSense Water Budget Tool's equation for Landscape Water Requirement (May 2009 revision, *http://www.epa.gov/watersense/specs/homes.htm#tool*).

$$DLWR_H = RTM \times [(ET_0 \times K_L) - R_a] \times A \times C_u$$

Where:

RTM = Run time multiplier, equal to 1/low quarter distribution uniformity (dimensionless)

ET_0 = average reference evapotranspiration (ET_0) for the site's peak watering month, provided locally (inches/month)

K_L = Landscape coefficient for type of plant in that hydrozone

R_a = Allowable rainfall (25% of average monthly rainfall for the site's peak watering month, provided locally (inches/month))

A = Area of hydrozone (square feet)

C_u = Conversion factor (0.6233 for results in gallons/month)

Part 2: DESIGNED LANDSCAPE WATER REQUIREMENT				
ET_0 = Average monthly reference evapotranspiration for the site's peak watering month (inches/month) as entered in Part 1		R_a = Allowable rainfall = 25% of average monthly rainfall for the site's peak watering month (inches/month)		
4		2		
Area of hydrozone (square feet)*	Plant type within hydrozone	K_L = Landscape coefficient**	Distribution uniformity*** (enter fraction %, i.e. 80% = .80)	Landscape water requirement (gallons/month)
5,000	Trees	0.5	0.75	6,233
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Designed Landscape Water Requirement (gallons/month)				15,790

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TABLE 1: PLANT TYPE AND ESTIMATED LANDSCAPE COEFFICIENT (K_L)			
Plant Type	K_L Water Requirements:		
	Low	Medium	High
Ground Cover	0.2	0.5	0.7
Shrubs	0.2	0.5	0.7
Trees	0.2	0.5	0.9
Turfgrass	0.6	0.7	0.8

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

TABLE 2: DISTRIBUTION UNIFORMITY	
Irrigation Type	DU_{LQ} or EU*
Drip - Standard	70%
Drip - Press Comp	90%
Fixed Spray	65%
Micro Spray	70%
Rotor	70%

Note: The lower quarter distribution uniformity values in Table 2 are taken from the U.S. EPA WaterSense Water Budget Tool (May 2009 rev.). Original source: The Irrigation Association, "Landscape Irrigation Scheduling and Water Management," IA 2005.

*Lower quarter distribution uniformity (DU_{LQ}) applies to sprinkler zones and **emission uniformity** (EU) applies to drip/micro-irrigation zones.

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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 x [(ET0 x KL) – Ra] x A x 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

Designed Landscape Water Requirement

TABLE 1: PLANT TYPE AND ESTIMATED LANDSCAPE COEFFICIENT (K_L)

Plant Type	K_L Water Requirements		
	Low	Medium	High
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*Lower quarter distribution uniformity $DU_{(LQ)}$ applies to sprinker zones and **emission uniformity** (EU) applies to drip/micro-irrigation zones.

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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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Irrigation: Temporary or Permanent

Irrigation: Temporary or Permanent

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

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

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

schacht | aslani architects

Electrical Car Charging Stations

Raised Pedestrian Crossing

Energy Efficient Lighting

Permeable Pavers

Conveyance Swales

Dedicated Parking for Smart Cars & Motorcycles

Generous Landscape Buffers

Site Plan

ADA Accessible Routes of Travel

Generous Perimeter & Interior Landscape Buffers

Rain Gardens

Pervious Concrete Pavements

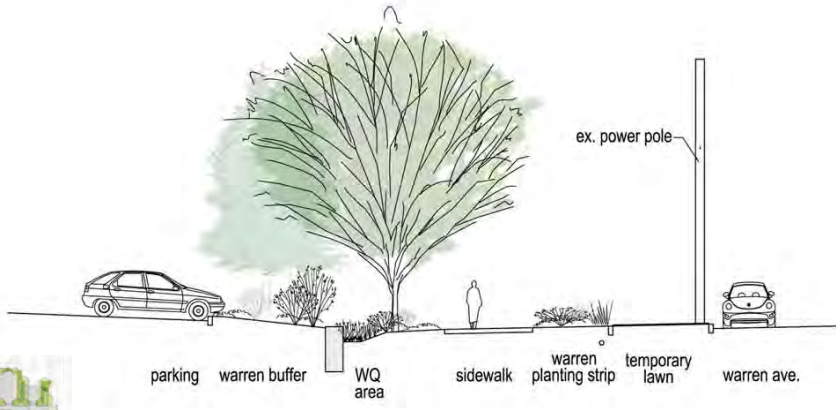
ADA Accessible Routes of Travel

Rain Gardens

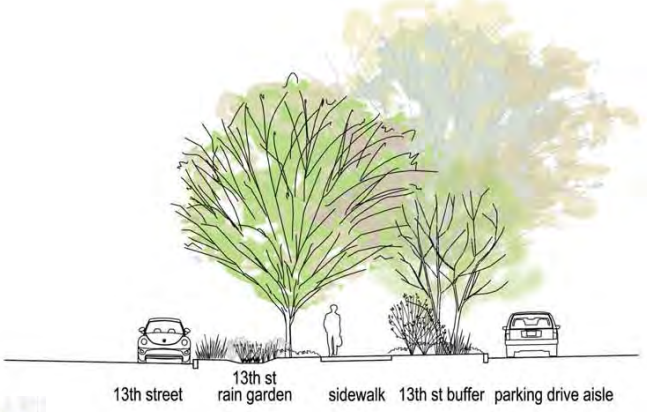
Broadway Avenue Looking North

Parking Island Looking North

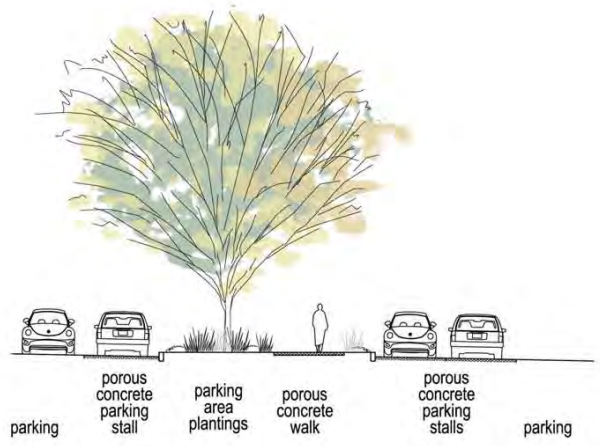
Warren Avenue Looking North



13th Street Looking West



Pedestrian Walkway Looking West



Electrical Car Charging Stations

Raised Pedestrian Crossing

Energy Efficient Lighting

Permeable Pavers

Conveyance Swales

Dedicated Parking for Smart Cars & Motorcycles

Generous Landscape Buffers

Site Plan

ADA Accessible Routes of Travel

Generous Perimeter & Interior Landscape Buffers

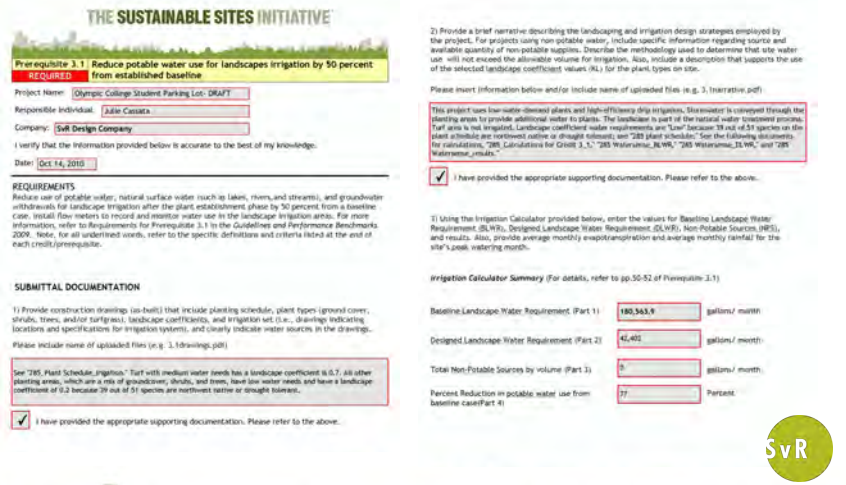
Rain Gardens

Pervious Concrete Pavements

ADA Accessible Routes of Travel

Rain Gardens

Prerequisite 3.1 Documentation



THE SUSTAINABLE SITES INITIATIVE

Prerequisite 3.1 Reduce potable water use for landscapes irrigation by 50 percent
REQUIRED from established baseline

Project Name: Olympic College Student Parking Lot- DRAFT
Responsible Individual: Julie Cassata
Company: SvR Design Company

I verify that the information provided below is accurate to the best of my knowledge.

Date: Oct 14, 2010

REQUIREMENTS

Reduce use of potable water, natural surface water (such as lakes, rivers, and streams), and groundwater withdrawals for landscape irrigation after the plant establishment phase by 50 percent from a baseline case. Install flow meters to record and monitor water use in the landscape irrigation areas. For more information, refer to Requirements for Prerequisite 3.1 in the *Guidelines and Performance Benchmarks 2009*. Note, for all underlined words, refer to the specific definitions and criteria listed at the end of each credit/prerequisite.

SUBMITTAL DOCUMENTATION

1) Provide construction drawings (as-built) that include planting schedule, plant types (ground cover, shrubs, trees, and/or turfgrass), landscape coefficients, and irrigation set (i.e., drawings indicating locations and specifications for irrigation systems), and clearly indicate water sources in the drawings.

Please include name of uploaded files (e.g. 1.1drawings.pdf)

See "285_Plant Schedule_Irrigation." Turf with medium water needs has a landscape coefficient is 0.7. All other planting areas, which are a mix of groundcover, shrubs, and trees, have low water needs and have a landscape coefficient of 0.2 because 29 out of 51 species are northwest native or drought tolerant.

☑ I have provided the appropriate supporting documentation. Please refer to the above.

2) Provide a brief narrative describing the landscaping and irrigation design strategies employed by the project. For projects using non potable water, include specific information regarding source and available quantity of non-potable supplies. Describe the methodology used to determine that site water use will not exceed the allowable volume for irrigation. Also, include a description that supports the use of the selected landscape coefficient values (KL) for the plant types on site.

Please insert information below and/or include name of uploaded files (e.g. 3. Inarrative.pdf)

This project uses low water-demand plants and high-efficiency drip irrigation. Stormwater is conveyed through the planting areas to provide additional water to plants. The landscape is part of the natural water treatment process. Turf area is not irrigated. Landscape coefficient water requirements are "Low" because 29 out of 51 species on the plant schedule are northwest native or drought tolerant; see "285 plant schedule." See the following documents for calculations, "285_Calculations for Credit 3_1," "285 Watersense_BLWR," "285 Watersense_DLWR," and "285 Watersense_results."

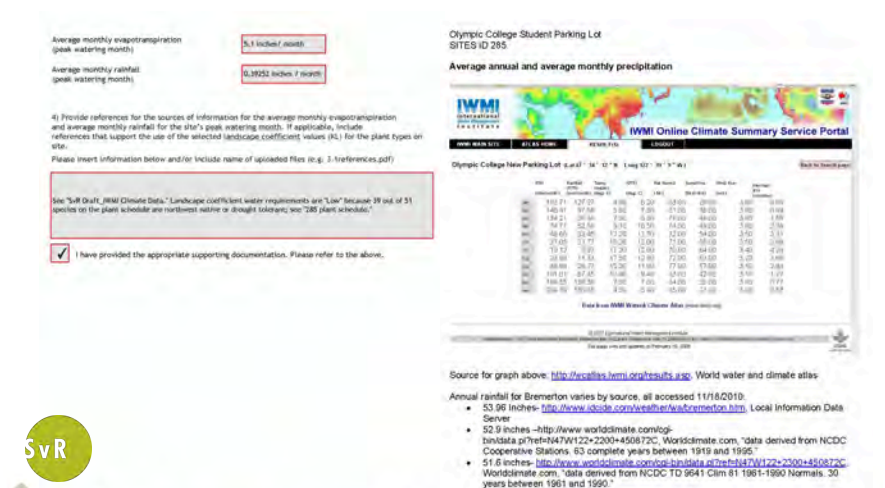
☑ I have provided the appropriate supporting documentation. Please refer to the above.

3) Using the Irrigation Calculator provided below, enter the values for Baseline Landscape Water Requirement (BLWR), Designed Landscape Water Requirement (DLWR), Non-Potable Sources (NPS), and results. Also, provide average monthly evapotranspiration and average monthly rainfall for the site's peak watering month.

Irrigation Calculator Summary (For details, refer to pp.50-52 of Prerequisite 3.1)

Baseline Landscape Water Requirement (Part 1)	180,563.9	gallons/ month
Designed Landscape Water Requirement (Part 2)	42,401	gallons/ month
Total Non-Potable Sources by volume (Part 3)	0	gallons/ month
Percent Reduction in potable water use from baseline case(Part 4)	77	Percent

Prerequisite 3.1 Documentation



Average monthly evapotranspiration (peak watering month): 5.1 inches/ month

Average monthly rainfall (peak watering month): 0.39252 inches / month

4) Provide references for the sources of information for the average monthly evapotranspiration and average monthly rainfall for the site's peak watering month. If applicable, include references that support the use of the selected landscape coefficient values (KL) for the plant types on site.

Please insert information below and/or include name of uploaded files (e.g. 3.1references.pdf)

See "SvR Draft_IWMI Climate Data." Landscape coefficient water requirements are "Low" because 29 out of 51 species on the plant schedule are northwest native or drought tolerant; see "285 plant schedule."

☑ I have provided the appropriate supporting documentation. Please refer to the above.

Olympic College Student Parking Lot
SITES ID 285

Average annual and average monthly precipitation

IWMI Online Climate Summary Service Portal

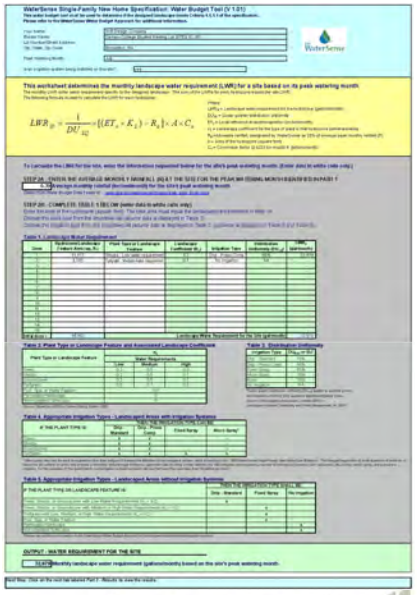
Olympic College New Parking Lot

Source for graph above: http://wcatlas.iwmi.org/results.asp, World water and climate atlas

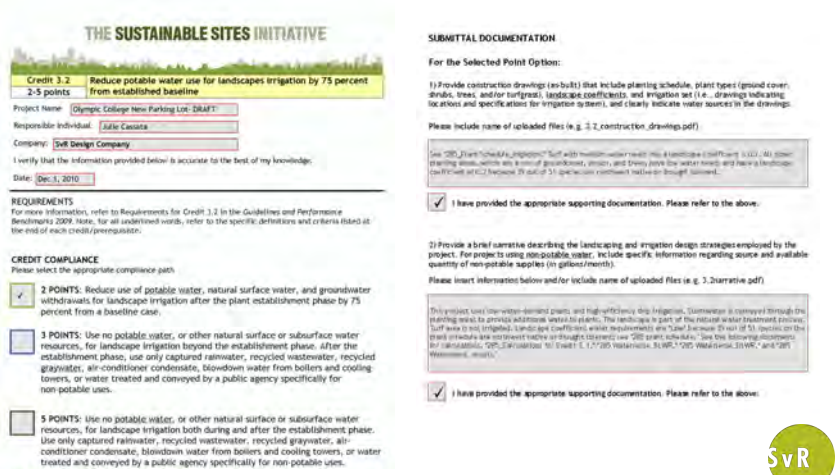
Annual rainfall for Bremerton varies by source, all accessed 11/18/2010:

- 53.96 inches- http://www.idcide.com/weather/wa/bremerton.htm, Local Information Data Server
- 52.9 inches –http://www.worldclimate.com/cgi-bin/data.pl?ref=N47W122+2200+450872C, Worldclimate.com, "data derived from NCDC Cooperative Stations. 63 complete years between 1919 and 1995."
- 51.6 inches- http://www.worldclimate.com/cgi-bin/data.pl?ref=N47W122+2500+450872C, Worldclimate.com, "data derived from NCDC TD 9641 Clim 81 1961-1990 Normals. 30 years between 1961 and 1990."

Prerequisite 3.1 Documentation



Credit 3.2 Documentation


THE SUSTAINABLE SITES INITIATIVE

Credit 3.2 — 2-5 points — Reduce potable water use for landscapes irrigation by 75 percent from established baseline

Project Name: Olympic College New Parking Lot- DRAFT

Responsible Individual: Julie Cassata

Company: Swit Design Company

I verify that the information provided below is accurate to the best of my knowledge.

Date: Dec-1, 2010

REQUIREMENTS

For more information, refer to Requirements for Credit 3.2 in the *Guidelines and Performance Benchmarks 2009*. Note, for all undefined words, refer to the specific definitions and criteria listed at the end of each credit/prerequisite.

CREDIT COMPLIANCE

Please select the appropriate compliance path

- ☑ **2 POINTS:** Reduce use of potable water, natural surface water, and groundwater withdrawals for landscape irrigation after the plant establishment phase by 75 percent from a baseline case.
- ☐ **3 POINTS:** Use no potable water, or other natural surface or subsurface water resources, for landscape irrigation beyond the establishment phase. After the establishment phase, use only captured rainwater, recycled wastewater, recycled graywater, air-conditioner condensate, blowdown water from boilers and cooling towers, or water treated and conveyed by a public agency specifically for non-potable uses.
- ☐ **5 POINTS:** Use no potable water, or other natural surface or subsurface water resources, for landscape irrigation both during and after the establishment phase. Use only captured rainwater, recycled wastewater, recycled graywater, air-conditioner condensate, blowdown water from boilers and cooling towers, or water treated and conveyed by a public agency specifically for non-potable uses.

SUBMITTAL DOCUMENTATION

For the Selected Point Option:

1) Provide construction drawings (as-built) that include planting schedule, plant types (ground cover, shrubs, trees, and/or turfgrass), landscape coefficients, and irrigation set (i.e., drawings indicating locations and specifications for irrigation system), and clearly indicate water sources in the drawings.

Please include name of uploaded files (e.g. 3.2_construction_drawings.pdf)

☑ I have provided the appropriate supporting documentation. Please refer to the above.

2) Provide a brief narrative describing the landscaping and irrigation design strategies employed by the project. For projects using non-potable water, include specific information regarding source and available quantity of non-potable supplies (in gallons/month).

Please insert information below and/or include name of uploaded files (e.g. 3.2narrative.pdf)

☑ I have provided the appropriate supporting documentation. Please refer to the above.

Credit 3.2 Documentation

2) **For the 2 point option only:** Using the Irrigation Calculator provided below, enter the values for Baseline Landscape Water Requirement (BLWR), Designed Landscape Water Requirement (DLWR), Non-Potable Sources (NPS), and results. Also, provide average monthly evapotranspiration and average monthly rainfall for the site's peak watering month.

Irrigation Calculator Summary (For details, refer to pp.50-52 of Prerequisite 3.1)

Baseline Landscape Water Requirement (Part 1)	180,543.9	gallons/ month
Designed Landscape Water Requirement (Part 2)	[illegible]	gallons/ month
Total Non-Potable Sources by volume (Part 3)	0	gallons/ month
Percent Reduction in potable water use from baseline case(Part 4)	[illegible]	Percent
Average monthly evapotranspiration (peak watering month)	[illegible]	inches/year
Average monthly rainfall (peak watering month)	[illegible]	inches/year

4) **For the 2 point option only**, provide references for the sources of information for the average monthly evapotranspiration and average monthly rainfall for the site's peak watering month. Also include a brief narrative (including references, if applicable) to support the use of the selected landscape coefficient values (KL) for the plant types on site.

Please insert information below and/or include name of uploaded files (e.g. 3.2reference.pdf)

[illegible]

☑ I have provided the appropriate supporting documentation. Please refer to the above.

Note: Supportive documents under Prereq 3.1 apply to this credit also.

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

↑ After Construction

←Under Construction:
Porous walks, curb cuts and swales

SvR

High Point Right-of-Way Swales

- Vegetated
- Grass-lined
- Conveyance
- Amended soils

SvR

THE SUSTAINABLE SITES INITIATIVE™

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

or email
info@sustainablesites.org

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
ASLA Library & Education Advocacy Fund

Lady Bird Johnson Wildflower center

United States Botanic Garden