

THE **A B C** 'S
of

Planning a New
Green School

in the Puget Sound Region



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What does it Mean to Build a Green School?

- Utilizes Life-Cycle Thinking
- Integrates Design Process
- Conserves and Protects the Environment in a Comprehensive Manner
- Provides High Performance Learning Environment



Green Schools Support Learning by providing:

- Health & Comfort
 - air, light, views, sound
- Long Life
- Ease in Operations & Maintenance
- Resource Efficiency
 - Conserves energy, water, & materials
- Adaptive & Multiple Use
- Sensitive Site Development
- Safety



Terrace Park School entry at twilight;
photo courtesy of INTEGRUS
Architects

Day to Day Benefits of a High Performance School

§ Human Resources

§ Reduce staff turnover, absenteeism, recruitment

§ Facilities Management

§ Lower utility consumption, better informed FM personnel

§ Capital Projects

§ Expedited approval, public acceptance, budget enhancements

§ Quality Assurance/Performance

§ Improved test results, reduced clerical errors, student attendance

§ Constituency/Shareholders/Benefactors

§ Improve bond/levy success for public projects, Board buy-in, community alliances

§ Marketing & Public Relations

§ Positive publicity

§ Insurance Rates

§ Reducing risk of litigation due to poor indoor air quality



Green Building: On The Path to Sustainability

Conventional

CHPS

WSSP

Green Building

Sustainable

LEED™
Schools
Application
Guide



Sustainable School Guidelines

- Seattle's Partnership for Resource Efficient Schools (1998)
- Collaborative for High Performance Schools – CHPS (2002)
- Washington Sustainable Schools Protocol –WSSP (2006)
- LEED Application Guide for Schools (2006 Draft)

Washington State Green Building Legislation ESHB 1272/ESSB 5509

- Mandates LEED Silver for all buildings funded in the state's capital budget OR WSSP for K-12 Schools, unless it is found to be not practical for the project to meet either of these standards.
- Designates the School Facilities Advisory Board (SFAB) as a high performance buildings advisory committee.
- Requires development of administration guidelines for school districts.

Washington State Green Building Legislation ESHB 1272/ESSB 5509

- Authorized review and development of implementation process for:
 - A&E fees
 - Energy Life Cycle Conservation Analysis
 - Value Engineering
 - Constructability Reviews
 - Building Commissioning
- Phased in Implementation:
 - Program Development (complete by 6/30/06)
 - Volunteer projects (for one year, 7/1/06-6/30/07)
 - Class 1 projects (requirement begins 7/1/07)
 - Class 2 projects (requirement kicks in 7/1/08)

Washington State Green Building Legislation ESHB 1272/ESSB 5509

- Requires reporting of results:
 - School districts report annually on projects for 5 years after construction
 - Calls for SFAB Advisory Committee recommendations on training, implementation and disincentives, etc.
 - Reports shall document operating savings in energy, utility, and maintenance costs as well as impacts on productivity and student performance.

Protocol (WSSP) Categories

Available Points

- Site – 17 points
- Water – 6 points
- Materials – 17 points
- Energy – 24 points
- Indoor Environmental Quality – 24 points
- Extra Credits – 8 points
 - Integrated Design (Eco-charrette)
 - Operations (Green Power, POE, LCCA)
 - Education
 - Innovation (Menu)

WSSP Scorecard

Protocol Scorecard				
Category	Group	Credit Name	Points	Achieved
Site 17 points	1) Selection & Use	S1.0 Code Compliance	R	
		S1.1 Sensitive Areas	1	
		S1.2 Greenfields	1	
		S1.3 Central Location	1	
		S1.4 Joint Use of On-Site Facilities	1-2	
		S1.5 Joint Use of Off Site Facilities	1	
	2) Transportation	S2.1 Public	1	
		S2.2 Bicycles	1	
		S2.3 Parking	1	
	3) Stormwater Management	S3.0 Temporary Sedimentation and Erosion Control	R	
		S3.1 Onsite Infiltration	1	
		S3.2 Runoff Treatment or Reduction	1	
		S3.3 Enhanced Treatment	1	
	4) Outdoor Surfaces	S4.1 Heat Island Reduction Through Landscaping	1	
		S4.2 Heat Island Reduction Through Roof Design	1	
	5) Outdoor Lighting	S5.1 Light Pollution Reduction	1	
	Water 6 points	1) Outdoor Systems	W1.0 Water Use Budget	R
W1.1 Irrigation Water Reduction (50%, 100%)			1-2	
W1.2 Scheduling Controller			1	
2) Indoor Systems	W2.1 Potable Water Use for Bldg Sewage Reduction (45%)	1		
	W2.2 Potable Water Use Reduction (20%, 30%)	1-2		
Materials 17 Points	1) Waste Reduction & Efficient Use	M1.0 Storage and Collection of Recyclables	R	
		M1.1 Waste Reduction (50%, 75%)	1-2	
		M1.2 Bldg. Structure/Shell Reuse (50%, 75%)	1-2	
		M1.3 Bldg. Non-Shell Reuse (50%)	1	
		M1.4 Salvaged or Refurbished Bldg. Materials (5%, 10%)	1-2	
		M1.5 Salvaged or Refurbished Furn. & Equip. (30%)	1	
	2) Environmental Procurement	M2.1 Recycled Content (5%/4 mts, 10%/8 mts)	1-2	
		M2.2 Rapidly Renewable Materials	1	
		M2.3 Certified Wood (20%, 50%, Chain of Custody)	1-3	
		M2.4 Eliminate Ozone-Depleting Substances	1	
		M2.5 Regional/Local Manufactured Materials (20%, also raw materials)	1-2	
Energy 24 Points	1) Efficiency	E1.0 Minimum Energy Performance	R	
		E1.1 Superior Energy Performance	4-12	
	2) Controls	E2.1 HVAC and Operable Windows	1	
		E2.2 Daylight-Responsive Controls	1	
	3) On-Site Alternative Sources	E3.1 Renewable Energy (5-10% bldg supply)	1-4	
		E3.2 Distributed Generation (5-10% bldg supply)	1-3	
	4) Commissioning	E4.0 Fundamental Commissioning	R	
		E4.1 Additional Commissioning	2	
	5) Management	E5.1 Energy Management Systems	1	

Protocol Scorecard cont.				
Category	Group	Credit Name	Points	Achieved
Indoor Environmental Quality 24 points	1) Daylighting	IEQ1.0 2% Daylight Factor (New const. 50% critical visual spaces)	R	
		IEQ1.1 2% Daylight Factor (75%, 100% critical visual spaces)	1-3	
		IEQ1.2 Fixed-position Shading	1	
		IEQ1.3 Direct Line of Vision Glazing	1	
	2) Electric Lighting Quality	IEQ2.1 Electric Lighting Quality	1	
	3) Indoor Air Quality	IEQ3.0 Ventilation, Filtration, & Moisture Control Minimums	R	
		IEQ3.1 Low-Emitting Interior Finishes	1-4	
		IEQ3.2 Low-Emitting Materials Furniture & Seating	1	
		IEQ3.3 Source Control	1	
		IEQ3.4 Ducted HVAC Returns	1	
		IEQ3.5 Particle Arrestance Filtration	1	
		IEQ3.6 IAQ Management (construction, pre-occupancy)	1-2	
	4) Acoustics	IEQ4.0 Minimum Acoustic Performance	R	
		IEQ4.1 Improved Acoustical Performance	1-2	
	5) Thermal Comfort	IEQ4.2 Enhanced Audio	1	
		IEQ5.0 ASHRAE 55 Code Compliance	R	
	6) User Controls	IEQ6.1 User Control (operable windows)	1	
IEQ6.2 User Control (temperature and lighting controls)		1		
Extra Credits 8 points	1) Integrated Design	EX1.1 Eco-Charette	1	
	2) Operations	EX2.1 Green Power	1	
		EX2.2 Post Occupancy Evaluation	1	
		EX2.3 Life Cycle Cost Analysis	1	
3) Education	EX3.1 Green Building Learning Opportunities	1		
4) Innovation	EX4.1 Project and/or District	1-3		
Total Possible Points			96	
Minimum required for Washington Sustainable School (4 points must be from Energy Performance Credit E1.1 and no more than 5 points (of the minimum 40) from the Extra Credit category)			40	



Protocol Energy Credits

- Efficiency
 - Minimum Performance (R)
 - Superior Performance (Must achieve 4 credits)
- Controls
 - HVAC & Operable Windows
 - Daylight Responsive Controls
- On-Site Alternative Sources
 - Renewable Energy
 - Distributed Generation
- Commissioning
 - Fundamental Commissioning
 - Additional Commissioning

Other MEP Credits

- Indoor Water Conservation
- Electric Lighting Quality
- Thermal Comfort
- Extra Credits:
 - Eco-Charrette
 - Post-Occupancy Evaluation

WSSP Credit Explanations

Required Credit Sample

WATER

Outdoor Systems

Purpose: Reduce water use for landscaping and ornamentation.

W1.0: Create Water Use Budget

Required	Develop and design a landscape and ornamental water-use budget that conforms to local water efficient landscape ordinances. If no local ordinance exists, use the landscape and ornamental budget ordinance developed by the City of Bellevue.
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To comply with this credit, calculate the estimated water use (EWU) landscape and the Maximum Applied Water Allowance (MAWA) for the landscape. The EWU must not exceed the MAWA. Once a water budget is established, design the landscape to meet established budget baselines.

MAWA is the most irrigation water allowed for the landscape on an annual basis. It takes into account local conditions and the size of the landscape area and is calculated as follows:

$$\text{MAWA} = (\text{ET}) (\text{LA}) (0.8) (0.62)$$

Where:

MAWA = Maximum Applied Water Allowance (gallons per year).

ET = Evapotranspiration Rate for the site (inches per year): The amount of water that transpires from plants and evaporates from adjacent soil surfaces. ET takes into account local soil conditions and the local, average annual net rainfall (total rainfall minus runoff).

LA = Landscaped Area (ft²).

0.8 = ET Adjustment Factor. This factor adjusts for plant factors and irrigation efficiency.

0.62 = Conversion Factor. This converts the maximum applied water allowance to units of gallons per year.

To estimate total annual irrigation water use, calculate the EWU for each plant zone according to the equation below, then sum up the EWUs for all zones in the landscaped area:

$$\text{EWU} = (\text{ET}) (\text{PF}) (\text{LA}) (0.62)/\text{IE}$$

Where:

EWU = Estimated Water Use (gallons per year).

ET = Evapotranspiration Rate for the site (inches per year).

PF = Plant Factor for the zone (For low water use plants PF = 0 to 0.3, medium water use plants, PF = 0.4 to 0.6, high water use plants, PF = 0.7 to 1; all irrigated turfgrass, PF = 0.8 to 1).

LA = Landscape Area (ft²) for the zone.

0.62 = Conversion Factor (to gallons per ft²). This converts EWU to units of gallons per year.

IE = Irrigation Efficiency (0.625 for conventional overhead spray systems, 0.925 for low volume or drip irrigation systems).

Sports or activity fields are considered recreational areas and may require water in addition to the MAWA. A statement should be included with the landscape design plan, designating recreational areas to be used for such purposes and specifying any needed amount of additional water above the MAWA.

Resources

WSSP Workbook has a sheet for calculating your water use budget and evaluating if you reach the 50% threshold for Credit 1.1 Irrigation Water Use Reduction.



WSSP Credit Explanation

Optional Credit Sample

W1.1: Irrigation Water Reduction

50% = 1 point
100% or no permanent = 2 points

Reduce potable and river or groundwater irrigation district water consumption for irrigation by 50% over landscape budget baselines with the use of water-efficient native (or adapted) climate-tolerant plantings, high-efficiency irrigation technologies, or using captured rain or municipally provided reclaimed water.

For an additional point, reduce potable and river or groundwater irrigation district water for site irrigation by additional 50% (a total of 100% reduction in water use) from water budget baselines; OR do not install permanent landscape irrigation systems.

Water resources are a growing concern in Washington, even in the rain-drenched west, as expanding populations and multiple uses increase the demand for limited supplies. Precipitation patterns in much of Washington make it difficult to store enough rainwater for irrigation through the dry summers, though school grounds may not require irrigation during summer months. High efficiency irrigation technologies such as micro irrigation, moisture sensors, and weather-data based controllers save water by reducing evaporation losses or operating only when needed. However, these systems require careful design, as well as additional operations and maintenance requirements. For example, some drip irrigation systems may be more vulnerable to vandalism; moisture sensors must be carefully placed to represent the soil type and exposure of individual irrigation zones accurately; and timers and controls, if not weather-data based, need to be adjusted seasonally.

Resources

Local water utility staff, water efficient landscape consultants, Certified Irrigation Designers (<http://www.irrigation.org/>), and Master Gardeners would also be good resources for helping achieve this credit.

Washington Native Plant Society, <http://www.wnps.org/>



WSSP Workbook

Workplan Sheet

Name of School:	Points			Action Needed	Who Responsible	Special Notes
	Possible	Yes	Maybe			
Site						
1) Selection & Use						
S1.0 Code Compliance	R	R	R			
S1.1 Sensitive Areas	1					
S1.2 Greenfields	1					
S1.3 Central Location	1					
S1.4 Joint Use of On-Site Facilities	1-2					
S1.5 Joint Use of Off-Site Facilities	1					
S1.6 Minimal Footprint	1-2					
2) Transportation						
S2.1 Public	1					
S2.2 Bicycles	1					
S2.3 Parking	1					
3) Stormwater Management						
S3.0 Sedimentation and Erosion Control	R	R	R			
S3.1 On-site Infiltration	1					
S3.2 Runoff Treatment or Reduction	1					
S3.3 Enhanced Treatment	1					
4) Outdoor Surfaces						
S4.1 Heat Island Reduction Through Landscaping	1					
S4.2 Heat Island Reduction Through Roof Design	1					
5) Outdoor Lighting						
S5.1 Light Pollution Reduction	1					
Subtotal Site	17	0	0			

WSSP Workbook

Scorecard Sheet

Name of School: _____	Points	
	Possible	Yes
Site		
1) Selection & Use		
S1.0 Code Compliance	R	R
S1.1 Sensitive Areas	1	
S1.2 Greenfields	1	
S1.3 Central Location	1	
S1.4 Joint Use of On-Site Facilities	1-2	
S1.5 Joint Use of Off-Site Facilities	1	
S1.6 Minimal Footprint	1-2	
2) Transportation		
S2.1 Public	1	
S2.2 Bicycles	1	
S2.3 Parking	1	
3) Stormwater Management		
S3.0 Sedimentation and Erosion Control	R	R
S3.1 On-site Infiltration	1	
S3.2 Runoff Treatment or Reduction	1	
S3.3 Enhanced Treatment	1	
4) Outdoor Surfaces		
S4.1 Heat Island Reduction Through Landscaping	1	
S4.2 Heat Island Reduction Through Roof Design	1	
5) Outdoor Lighting		
S5.1 Light Pollution Reduction	1	
Subtotal Site	17	

Total Possible Points	96
Minimum required for Washington Sustainable School	40
	More Points Please
4 points must be from Energy Performance Credit E1.1	More Energy Points Please
No more than 5 points from the Extra Credit category can count towards r	



WSSP Worksheet

Water Budget Calculation Sheet

W1.0 Water Budget; W1.1 Irrigation Reduction

Calculate the Maximum Applied Water Allowance (MAWA)

$$MAWA = (ET) (LA) (0.8) (0.62)$$

ET (i/y)	LA (sf)	MAWA (gal/yr) =

Calculate the Estimated Water Use based on each Landscape Zone

$$EWU = (ET) (PF) (LA) (0.62)/IE$$

Zone	Area	Plant Factor	Irrigation Efficiency	EWU for Zone
1				
2				
3				
4				
5				
6				
7				
8				

Total

Results _____

ET = Evapotranspiration rate; The amount of water that transpires from plants and evaporates from adjacent soil surfaces. ET takes into account local soil conditions and the local, average annual net rainfall (total rainfall minus runoff). See protocol for suggested sources.

0.8 = ET Adjustment Factor. This factor adjusts for plant factors and irrigation efficiency.

PF = Plant Factor for the zone (For low water use plants PF = 0 to 0.3, medium water use plants, PF = 0.4 to 0.6, high water use plants, PF = 0.7 to 1; all irrigated turfgrass, PF = 0.8 to 1).

IE = Irrigation Efficiency (0.625 for conventional overhead spray systems, 0.925 for low volume or drip irrigation systems).

0.62 = Conversion Factor. This converts the maximum applied water allowance to units of gallons per year.



LEED® for Schools

for New Construction and Major Renovations

What's the Same as LEED NC V2.2?

Erosion & Sedimentation Control

Site Selection

Development Density & Community

Connectivity

Site Development

Stormwater Design

Heat Island Effect

Water Efficient Landscaping

Innovative Wastewater technologies

Water Use Reduction

Commissioning (Fundamental and
Enhanced)

Energy Performance (Minimum and
Optimization)

Refrigerant Management

Building Reuse

Construction Waste Management

Resource Reuse

Recycled Content

Regional Materials

Rapidly Renewable Materials

Certified Wood

Minimum IAQ Performance

Outdoor Air Delivery Monitoring

Increased Ventilation

Construction IAQ Management Plan

Thermal Comfort Controllability

Indoor Environmental Comfort (Design
& Verification)

Daylight & Views (Views)

Innovation in Design

LEED Accredited Professional



LEED® for Schools

for New Construction and Major Renovations

What's Different from LEED NC V2.2?

MODIFIED CREDITS:

Brownfield Redevelopment
Alternative Transportation
Light Pollution Reduction
On-Site Renewable Energy
Storage & Collection of Recyclables
Low Emitting Materials
Daylight & Views (Daylight)

NEW CREDITS:

Environmental Contamination-Free Site (PR)
Future Expansion Within Master Plan
Joint Use of Facilities
Process Water Use Reduction (20%)
Acoustical Performance (Min/Enhanced)
Mold Prevention
Low Impact Cleaning & Maintenance Policy
Innovation: The School as Teaching Tool