Module 8
LID + LEED

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Learning Objectives

- Summarize LEED ® requirements for Army projects per the most recent Army Sustainable Design and Development Policy Update.
- Describe how implementing Low Impact Development can help earn LEED credits in the Sustainable Sites and Water Efficiency categories.
- Describe changes from LEED 2009 to the LEED V4 Rating System as they relate to site planning and LID.

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Army LEED Requirements

- Army Sustainable Design and Development Policy Update (16 Dec 2013) requires all New Construction/Major Renovation to be certified at LEED Silver level.

> b. Validation Requirements. The Army standard for high-performance sustainable building/project rating and certification is the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. Other rating systems may be approved if equivalency is demonstrated. Waiver requests for use of a demonstrated equivalent rating system may be submitted per paragraph 3.c.
>
> i. New Construction/Major Renovation. All new construction vertical projects and comprehensive building renovations meeting the Minimum Program Requirements (MPRs), or having minimum characteristics set by the USGBC, except Family Housing, will incorporate sustainable design principles into site selection, design and construction. For purposes of this policy, comprehensive building renovations are defined as changes to a building's envelope, infrastructure, equipment, and systems that provide significant opportunities for substantial improvement in the sustainable design elements of the building, including energy and water efficiency. All such construction will be certified at the LEED for New Construction (LEED-NC) Silver level. The definitions and guidance on the MPRs are provided in a document titled Supplemental Guidance, available on the USGBC website (http://www.usgbc.org/resources/leed-2009-mpr-supplemental-guidance-revision-2-september-2011). Project teams will follow the rating system selection guidance (http://www.usgbc.org/leed/certification/choose) in deciding which LEED rating system is best for a given project. Vertical construction not meeting MPR thresholds will be designed and built to incorporate the applicable LEED sustainable design features available at the site, but will not require GBCI certification.

- Army SDD Policy Update Memo, page 7

Army LEED Requirements

- Army Sustainable Design and Development Policy Update (16 Dec 2013) requires Minor Renovations and Horizontal construction to incorporate applicable LEED credits.

> v. Minor Renovations. For all other building renovation projects, this policy only applies to the portions of the building or building systems that are being renovated. These renovations shall incorporate LEED Silver level features that are life-cycle cost effective within the program amount, and documentation shall be retained for at least five years to facilitate future building certification as a high performance sustainable building.
>
> vi. All horizontal construction projects, and other vertical construction not meeting the MPRs (e.g., communication huts, storage facilities, recreation fields) and utility systems, and any interest in land, must achieve the applicable LEED credit for sites, water, energy, materials and resources and meet the requirements in UFC 2-100-01 and UFC 3-210-10. While LEED certification is not required, documentation on which credits were achieved will be maintained by the installation.

- Army SDD Policy Update Memo, page 8

LEED 2009 New Construction and Major Renovations Credit Categories

LEED New Construction

Project Checklist	Possible Points
Sustainable Sites	26
Water Efficiency	10
Energy and Atmosphere	35
Materials and Resources	14
Indoor Environmental Quality	15
Innovation in Design	6
Regional Priority	4

Source: TexasLID.org

LID Can Help Earn These LEED Credits

Sustainable Sites

- Credit 1 - Site Selection (1 point)
- Credit 5.2 - Site Development, Maximize Open Space (1 point)
- Credit 6.1 - Stormwater Design, Quantity Control (1 point)
- Credit 6.2 - Stormwater Design, Quality Control (1 point)
- Credit 7.1 - Heat Island Effect, Non-Roof (1 point)
- Credit 7.2 - Heat Island Effect, Roof (1 point)

Water Efficiency

- Prerequisite 1 - Water Use Reduction Required
- Credit 1 - Water Efficient Landscaping (2-4 points)
- Credit 2 - Innovative Wastewater Technologies (2 points)
- Credit 3 - Water Use Reduction (2-4 points)

SS Credit 1 Site Selection

Do not develop buildings, hardscape, roads or parking on portions of sites that meet any of the following:

- Prime Farmland as defined by USDA
- Previously undeveloped land within 5 feet of 100-year FEMA floodplain
- Land identified as habitat for any federal or state endangered species
- Land within 100 feet of wetlands or defined setbacks
- Previously undeveloped land within 50 feet from water body that support or could support fish, recreations or industrial use
- Land that was public parkland

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 17

SS Credit 5.2 Maximize Open Space

CASE 1. Sites with Local Zoning Open Space Requirements

- Reduce the development footprint and/or provide vegetated open space within the project boundary such that the amount of open space exceeds local zoning requirements by 25%.

CASE 2. Sites with No Local Zoning Requirements (e.g. some university campuses, military bases)

- Provide a vegetated open space area adjacent to the building that is equal in area to the building footprint.

CASE 3. Sites with Zoning Ordinances but No Open Space Requirements

- Provide vegetated open space equal to 20% of the project site area.

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 85

SS Credit 5.2 Maximize Open Space

ALL CASES:

- For projects in urban areas that earn SS Credit 2: Development Density and Community Connectivity, vegetated roof areas and pedestrian-oriented hardscape can contribute to open space. For such projects, a minimum of 25% of the open space counted must be vegetated.

- Wetlands or naturally designed ponds may count as open space and the side slope gradients average 1:4 (vertical: horizontal) or less and are vegetated.

Source: EPA 2010

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 85

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SS Credit 6.1 Stormwater Design Quantity Control

The intent of this credit is to reduce the quantity of storm water runoff by reducing the impervious cover and increasing on-site infiltration.

Reducing stormwater runoff protects downstream surfaces waters by reducing erosion, flooding, and pollutant loads.

Source: Portland Cement Association.

- LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 91

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SS Credit 6.1 Stormwater Design Quantity Control

CASE 1. Sites with Existing Imperviousness 50% or Less (Greenfields)

- OPTION 1: Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the 1- and 2-year 24-hour design storms.
- OPTION 2: Implement a stormwater management plan that protects receiving stream channels from excessive erosion. The stormwater management plan must include stream channel protection and quantity control strategies.

CASE 2. Sites with Existing Imperviousness Greater Than 50% (Redevelopment)

- Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the 2-year 24-hour design storm.

- LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 91

EISA vs. LEED SSc6.1 Quantity

	EISA Section 438	LEED SSc 6.1 Quantity Control
Intent	Maintain or restore to the METF the pre-development hydrology of the property	Greenfield: Maintain pre-development runoff rate and volume from 1- and 2-year, 24-hour storm Redevelopment: Decrease runoff volume from 2-year, 24-hour storm by 25%
Rainfall Amount to Manage	Baltimore, MD 95th Percentile Rainfall Depth = 1.6 inches	Baltimore, MD 1-year, 24-hour Storm = 2.6 inches 2-year, 24-hour Storm = 3.2 inches
Calculations	Army LID Planning Tool and UFC 3-210-10 calculate a required runoff volume (cubic feet) to be retained on site	For greenfields, the runoff rate leaving the site (cubic feet per second) must be calculated in addition to volume

SS Credit 6.2 Stormwater Design Quality Control

The intent of this credit is to reduce pollutants in stormwater runoff in order to protect receiving waters.

- Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).
- BMPs used to treat runoff must be capable of removing 80% of the average annual post-development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if:
  - They are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards,

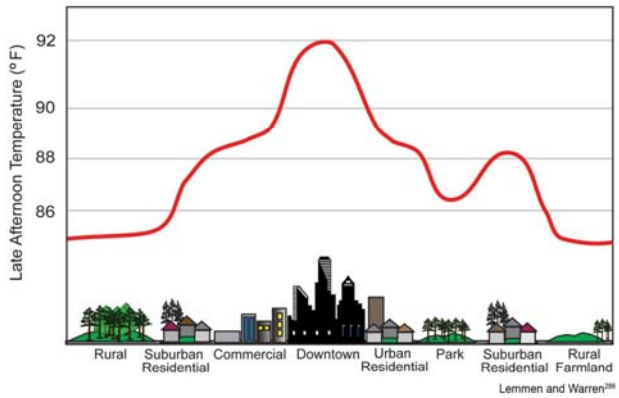
    OR
  - There exists infield performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 101

EISA vs. LEED SSc6.2 Quality

	EISA Section 438	LEED SSc 6.2 Quality Control
Intent	Maintain or restore to the METF the pre-development hydrology of the property	Reduce pollution in stormwater runoff Treat runoff using LID BMPs
Rainfall Amount to Manage	95th Percentile Storm	90% Average Annual Rainfall: Humid Watershed = 1 inch Semiarid Watershed = 0.75 inch Arid Watershed = 0.5 inch
Calculations	Using LID BMPs to meet EISA will also count towards SSc6.2	Meeting state or local stormwater quality permitting requirements will help earn this credit

SS Credits 7.1 - 7.2 Heat Island Effect



Large amounts of concrete and asphalt in cities absorb and hold heat. Tall buildings prevent heat from dissipating and reduce air flow. At the same time, there is generally little vegetation to provide shade and evaporative cooling. As a result, parts of cities can be up to 10°F warmer than the surrounding rural areas, compounding the temperature increases that people experience as a result of human-induced warming.

Source: Globalchange.gov

SS Credit 7.1 Heat Island Non-Roof

Reduce heat island effect from hardscape areas

- OPTION 1: Use any combo of the following strategies for 50% of the site hardscape (impervious area outside of the building)
  - Provide shade from tree canopy within 5 years of installation.
  - Provide shade from structures covered by solar panels.
  - Provide shade from architectural devices or structures that have Solar Reflectance Index (SRI) of at least 29.
  - Use hardscape materials with an SRI of at least 29.
  - Use an open-grid pavement system (at least 50% pervious)

- OPTION 2: Place a minimum of 50% of parking spaces under cover. Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof or be covered by solar panels that produce energy used to offset some nonrenewable resource use.

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 109

SS Credit 7.1 Heat Island Non-Roof

Implications for Military Installations:

- New Gray Concrete has SRI 35.
- Traditional asphalt parking lots will not count toward this credit.
- Projects with large parking requirements who want to earn this credit will have to budget to include concrete or alternative surfaces such as permeable pavers or open grid turf pavement. These are more expensive than traditional asphalt.

Fort Detrick Emergency Services Center Permeable Pavers

SS Credit 7.2 Heat Island Roof

The intent of this credit is to reduce the solar heat gain absorbed into a building through its roof, to reduce the cooling loads on the building.

- OPTION 1: Use roofing materials with high SRI for minimum 75% of roof surface.

Roof Type	Slope	SRI
Low-Sloped Roof	≤2:12	78
Steep-Sloped Roof	>2:12	29

- OPTION 2: Install **vegetated roof** for at least 50% of roof area.
- OPTION 3: Combination of vegetated roof and high SRI materials

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 119

WE Prereq. 1 Water Use Reduction

Intent

- To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

- Employ strategies that in total use 20% less water than the water use baseline calculated for the building (not including irrigation).

Potential Strategies include use rainwater harvesting and reuse.

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 165

WE Credit 1 Water Efficient Landscaping

Intent

- To limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation.

Requirements

- OPTION 1. Reduce by 50% from a calculated midsummer baseline (2 points)

OR

- OPTION 2. No Potable Water Use or Irrigation (4 points)

LEED Reference Guide for Green Building Design and Construction, 2009 Edition, page 179

WE Credit 2 Innovative Waste Water Technologies

Intent

- To reduce wastewater generation and potable water demand while increasing the local aquifer recharge.

Requirements

- OPTION 1: Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures or nonpotable water (captured rainwater, recycled graywater)

  OR
- OPTION 2: Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.

WE Credit 3 – Water Use Reduction

Intent

To further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

Employ strategies that in aggregate use less water than the water use baseline calculated for the building (not including irrigation). The minimum water savings percentage for each point threshold is as follows:

Percentage Reduction Points:

30% - 2 points

35% - 3 points

40% - 4 points

LEED Rating System Update – V4

- USGBC released LEED V4 in Nov 2013
- USACE projects must register projects in LEED V4 by May 2015
- USACE LEED V4 Implementation Guide to be released Aug 2014
- New Credit Categories
- Changes to Technical Content
- Revised Point Distribution
- USGBC reports that V4 reduces reporting requirements by 80% from LEED 2009

LEED Categories (Current and New)

Current LEED 2009 Credit Categories for BD+C:
Sustainable Sites (SS)
Water Efficiency (WE)
Energy and Atmosphere (EA)
Materials and Resources (MR)
Indoor Environmental Quality (IEQ)
Innovation in Design (ID)
Regional Priority Credit (RP)

LEED V4 Additional Credit Categories:
Integrative Process (IP)
Location and Transportation (LT)

There are New Prerequisites and New Credits within the Credit Categories!

Location and Transportation: New Category

This category focusing on site selection and alternative transportation.

Connectivity is about connecting people and infrastructure. Sites that are integrated in an existing community get more credits.

Source: Lightrailnow

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Location and Transportation V4

New Category:

- LEED for Neighborhood Development Location credit
- Sensitive Land Protection (renamed from Site Selection)
- High Priority Site (brownfields, etc.)
- Surrounding Density and Diverse Uses (renamed from Development Density and Community Connectivity)
- Access to Quality Transit (renamed from Alternative Transportation Public Transportation Access)
- Bicycle Facilities (need bicycle accessible site or bicycle network)
- Reduced Parking Footprint (renamed from Alternative Transportation Parking Capacity)
- Green Vehicles (more requirements than Low-Emitting FEV signage)

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Sustainable Sites (SS)

- This category focuses on minimizing development's impact on the surrounding environment.
- Rewards project sites that protect/improve surrounding ecosystems and avoid harming habitat and water bodies.
- Low Impact Development can be used to mimic pre-development hydrology and reduce the heat island effect.

Sustainable Sites V4

Credits

- Prerequisite: Construction Activity Pollution Prevention (updated with 2012 EPA General Permit)
- Site Assessment* (conduct site survey)
- Site Development Protect or Restore Habitat
- Open Space (added requirement that open space must be of beneficial use)
- Rainwater Management (combined Quantity and Quality credits, now requires management of 95th percentile storm and references EISA Section 438)
- Heat Island Reduction (combined Roof and Non-Roof Heat Island Effect credits)
- Light Pollution Reduction

* New Credit

Water Efficiency (WE)

Water efficiency measures can reduce water consumption and wastewater. Reducing water use also reduces the amount of energy required for treating and transporting water.

The Water Efficiency category has a number of significant changes, including **two new prerequisites** and new credits for additional indoor and outdoor water use reduction.

Water Efficiency V4

Credits

- Prerequisite: Outdoor Water Use Reduction*
- Prerequisite: Indoor Water Use Reduction
- Prerequisite: Building Level Water Metering* (total potable water use, share data with USGBC for 5 years)
- Outdoor Water Use Reduction
- Indoor Water Use Reduction
- Cooling Tower Water Use**
- Water Metering** (additional meters for water subsystems)

* New Prerequisite

** New Credit

Conclusion

Army projects are required to follow the USGBC's LEED Rating System, which includes all aspects of green building design and construction. Implementing Low Impact Development practices can help earn LEED credits by reducing runoff volume and frequency, improving water quality, reducing the heat island effect, reducing water use, and protecting the surrounding environment.

Questions & Answers

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