

SITES v2

Rating System

For Sustainable Land Design and Development



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I. Overview of SITES

As the world's population grows, so does the pace of urbanization and development. What is built on the land profoundly impacts ecological systems as well as the health, safety, and welfare of our communities. Too often, however, landscapes, infrastructure, and buildings are designed without regard to their harmful impacts on scarce resources, underlying ecological systems, and quality of life in the community. A systematic comprehensive set of guidelines and a rating system is needed to define sustainable sites, measure their performance, and ultimately elevate the value of landscapes.

The Sustainable Sites Initiative™ (SITES™) is a program based on the understanding that land is a crucial component of the built environment and can be planned, designed, developed, and maintained to avoid, mitigate, and even reverse these detrimental impacts. Sustainable landscapes create ecologically resilient communities better able to withstand and recover from episodic floods, droughts, wildfires, and other catastrophic events. They benefit the environment, property owners, and local and regional communities and economies.

In contrast to buildings, built landscapes and green infrastructure have the capacity to protect and even regenerate natural systems, thereby increasing the ecosystem services they provide. These services are the beneficial functions of healthy ecosystems such as sequestering carbon, filtering air and water, and regulating climate. Their economic value is highly significant, yet the cost of replacing these functions is rarely reflected in conventional decision-making. For example, wetlands filter pollutants and provide protection against storm surges and flooding. When wetlands are lost to development, new and costly levees, pipes, and pollution-control technology must perform the functions those wetlands previously provided naturally. Nevertheless, estimates for a project's total cost or value typically include neither these subsequent expenses nor additional benefits such as wildlife habitat.

By aligning land design and development practices with the functions of healthy ecosystems, the SITES program demonstrates how the work of developers, property owners, landscape architects, engineers, planners, architects, and others can protect, restore, and enhance ecosystem services. For environmental designers, their clients, and the general public, SITES offers several significant benefits and values: 1) it advances best practices in landscape architecture and other environmental design professions, 2) it may help design professionals fulfill their health, safety, and welfare responsibilities for licensure, 3) clients can be assured that their project has achieved rigorous, field-tested standards for sustainability, 4) clients can market the SITES certification of their projects (as many do for the LEED® green building program), and 5) it is ethically responsible, protects natural systems for present-day use and appreciation, and preserves ecosystems and their essential services for future generations.

The central message of the SITES program is that any project—whether the site of a university campus, large subdivision, shopping mall, park, commercial center, or even a home—holds the potential to protect, improve, and regenerate the benefits and services provided by healthy ecosystems.

SITES provides guidance and incentives that can transform land development and management practices towards regenerative design. The United States Botanic Garden, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin, and the American Society of Landscape Architects have led the development of these guidelines, which involves numerous other organizations and individuals. Development of the SITES v2 Rating System has been a collaborative, interdisciplinary effort made possible by the input of more than 70 dedicated contributors, including technical advisors, practitioners, and representatives of professional, advocacy, and educational organizations.

Since 2007, SITES has published three reports containing draft guidelines and performance benchmarks followed by extensive review of public comments. Following the release of the *Guidelines and Performance Benchmarks 2009* (version 1), this Rating System was field-tested through a two-year pilot program that involved more than 160 projects. Information and knowledge gained from participating pilot projects informed the development of the SITES v2 Rating System. The SITES Rating System is intended to be a living product that will evolve over time as research and experience generate more knowledge.

This document contains the SITES v2 Rating System with credits in an abbreviated format. It is intended to introduce readers to the main goals and requirements of sustainable land design and development within the structure of the Rating System.

For more insight and an in-depth view of the SITES v2 Rating System, please read the *SITES v2 Reference Guide* (www.sustainablesites.org).

SITES GUIDING PRINCIPLES

These principles informed the development of specific and measurable criteria for site sustainability, and can also be applied to the land design and development process.

Do no harm.

Make no changes to the site that will degrade the surrounding environment. Promote sustainable design projects on sites where previous disturbance or development presents an opportunity to regenerate ecosystem services through sustainable design.

Apply the precautionary principle.

Be cautious in making decisions that could threaten human and environmental health. Some actions can cause irreversible damage. Examine a full range of alternatives (including no action), and be open to contributions from all potentially affected parties.

Design with nature and culture.

Create and implement designs that are responsive to economic, environmental, and cultural conditions and to the local, regional, and global context.

Use a decision-making hierarchy of preservation, conservation, and regeneration.

Maximize the benefit of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.

Provide regenerative systems as intergenerational equity.

Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.

Support a living process.

Continuously re-evaluate assumptions and values, and adapt to demographic and environmental change.

Use a systems thinking approach.

Understand and value the relationships in an ecosystem. Use an approach that reflects and sustains ecosystem services and re-establishes the integral and essential relationship between natural processes and human activity.

Use a collaborative and ethical approach.

Encourage direct and open communication among colleagues, clients, manufacturers, and users to link long-term sustainability with ethical responsibility.

Maintain integrity in leadership and research.

Implement transparent and participatory leadership; develop research with technical rigor; and communicate new findings in a clear, consistent, and timely manner.

Foster environmental stewardship.

In all aspects of land development and management, foster an ethic of environmental stewardship—an understanding that responsible management of healthy ecosystems improves the quality of life for present and future generations.

ECOSYSTEM SERVICES: THE FRAMEWORK FOR SITES V2

The SITES v2 Rating System, and specifically its site-specific performance benchmarks, is based on the concept of ecosystem services; an understanding of natural processes; best practices in landscape architecture, ecological restoration, and related fields; and knowledge gained through peer-reviewed literature, case-study precedents, and SITES pilot projects. By achieving these benchmarks, a project will contribute to maintaining, supporting, and enhancing natural systems and the essential services they provide.

The services provided by healthy ecosystems are the unobtrusive foundation of daily life. Trees help regulate local climate by providing shade and acting as windbreaks. Through evaporation, transpiration, and the uptake and storage of carbon, plants moderate the climate of the world and provide a breathable atmosphere. Thousands of different pollinator species visit their respective flowers and promote the growth of myriad plants and crops. Soils and vegetation purify stormwater as it seeps through to groundwater and underground aquifers. Ecosystem services such as these occur at a variety of scales and in habitats ranging from equatorial rainforests to urban parks. Yet because these services occur largely unseen in the background and can be difficult to measure and monetize, their value is typically ignored in project design and budgeting. As a result, the ecosystem services provided by the site prior to construction are lost. Replacing these services, if it is possible to do so, would require expensive technological solutions.

An accurate accounting must take into consideration how the adoption of sustainable practices can not only be cost effective for both public and private entities but can leverage additional costs and provide multiple benefits. A growing body of research suggests that natural elements within cities and other areas generate ecosystem services that can substantially protect and improve a community's resiliency and quality of life in a variety of ways and in a range of contexts.

ECOSYSTEM SERVICES

Ecosystem services are goods and services of direct or indirect benefit to humans that are produced by ecosystem processes that involve the interactions of living elements, such as vegetation and soil organisms, and non-living elements such as bedrock, water, and air.

The *Millennium Ecosystem Assessment* 2005 report separated ecosystem services into four categories: Supporting (services that are necessary for the production of all other ecosystem services), Provisioning (products, such as food and water, obtained from ecosystems), Regulating (benefits obtained from the regulation of ecosystem processes such as carbon sequestration), and Cultural (nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences).

Researchers have developed various lists of these benefits and services. The Sustainable Sites Initiative has consolidated the research into the following list of ecosystem services that a sustainable site can protect or regenerate through sustainable land development and management practices.

Global climate regulation

- Maintaining balance of atmospheric gases at historic levels
- Maintaining healthy air quality
- Sequestering carbon

Local climate regulation

- Regulating local temperature, precipitation, and humidity through shading, evapotranspiration, and windbreaks

Air and water cleansing

- Removing and reducing pollutants in air and water

Water supply retention

- Storing and conserving water within watersheds and aquifers

Erosion and sediment control

- Retaining soil within an ecosystem
- Preventing damage from erosion and siltation

Hazard mitigation

- Reducing vulnerability to damage from flooding, storm surge, wildfire, and drought

Pollination

- Providing for the reproduction of crops and other plants

Habitat functions

- Providing refuge and reproduction habitat to plants and animals, contributing to the conservation of biological and genetic diversity and evolutionary processes

Waste decomposition and treatment

- Breaking down waste
- Cycling nutrients

Human health and well-being

- Enhancing physical, mental, and social well-being as a result of interaction with nature

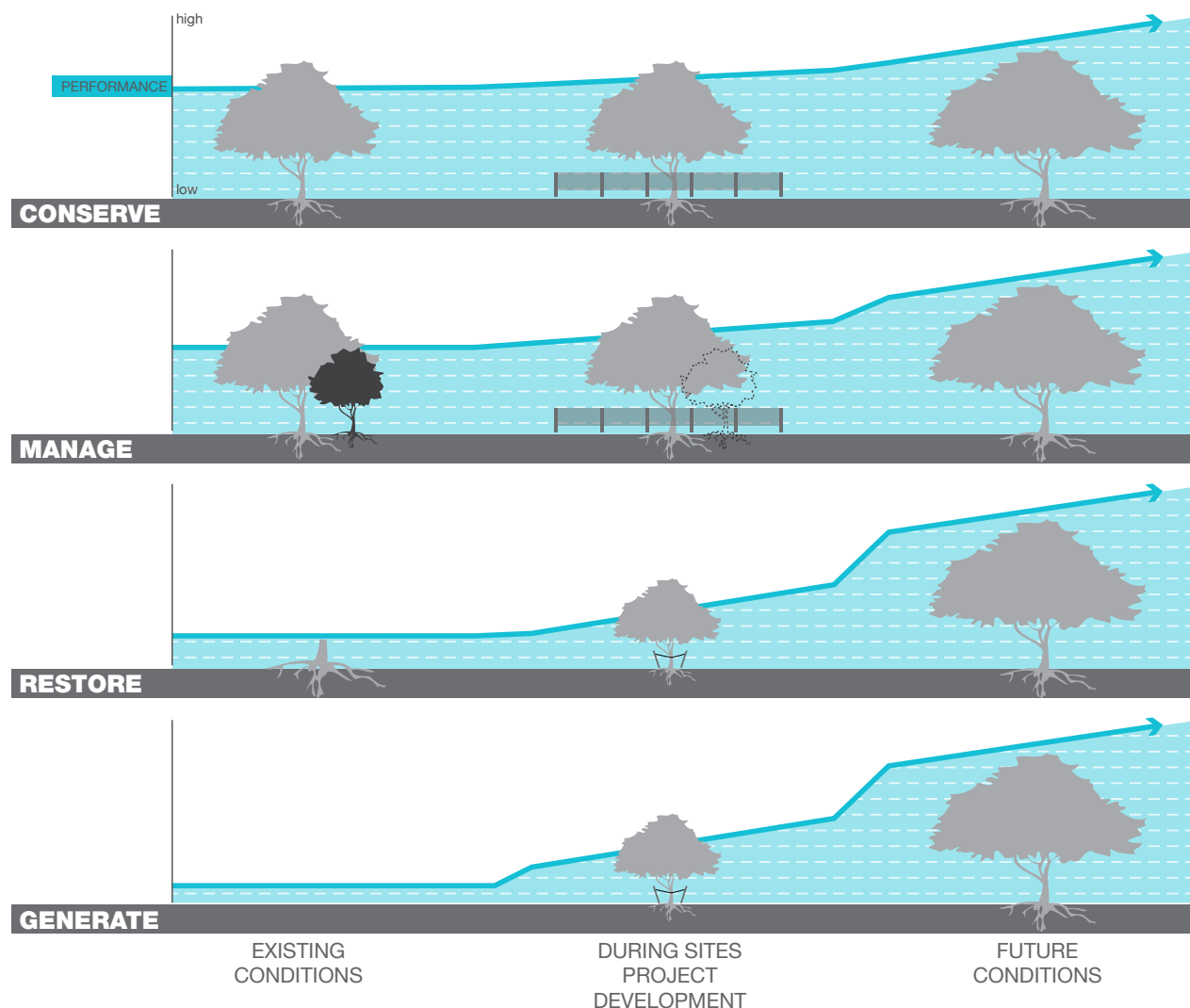
Food and renewable non-food products

- Producing food, fuel, energy, medicine, or other products for human use

Cultural benefits

- Enhancing cultural, educational, aesthetic, and spiritual experiences as a result of interaction with nature

SITES Decision-Making Hierarchy



Built sites can be modeled after healthy systems, thereby increasing the ecosystem services they provide post-development. Landscape performance increases as relationships between soil, vegetation, and organisms mature over long periods of time, becoming more complex and interdependent. The decision-making hierarchy provided by the SITES Guiding Principles (p. ix) gives projects a step-by-step framework for approaching existing site elements in order to conserve, manage, restore, or generate high-functioning ecosystems.

When healthy soil, vegetation, and habitat are found on site, management of these systems should take place to conserve biodiversity and the long-term health and vitality of the site. This management includes ensuring land design and development protect, maintain, and improve existing features (e.g., wetlands, habitat, floodplains) and appropriately remove and manage any undesirable elements (e.g., invasive species), which contribute to the loss of ecosystem function. When features such as large trees or streams have been lost to previous development, restore the landscape to regain performance benefits. On brownfields or previously developed sites with limited ecological activity, opportunities may exist to generate ecosystem services by planting native vegetation or implementing technologies such as raingardens or green roofs. Such management will ensure that future conditions will yield high-performance landscapes that provide ecosystem services.

THE GOALS FOR SITES V2

In the SITES v2 Rating System, a total of 200 potential points are allocated among 48 credits for a given project site. The Rating System reflects each credit's impact on improving site sustainability and protecting and restoring ecosystem services. Projects will receive SITES certification by achieving the minimum requirements (i.e. prerequisites) and a certain specified number of points for different levels of performance. The value assigned to each credit is based on its potential effectiveness in meeting the four goals outlined below.

SITES GOALS

Create Regenerative Systems and Foster Resiliency

- Protect and restore natural resources such as soil, water, and vegetation.
- Encourage biodiversity.
- Enhance landscapes to provide multiple ecosystem services such as cleaning air and water, providing habitat, and storing carbon.
- Mitigate for evolving hazards and natural disasters.
- Plan for monitoring and adaptive management.

Ensure Future Resource Supply and Mitigate Climate Change

- Minimize energy consumption and encourage use of low carbon and renewable energy sources.
- Minimize or eliminate greenhouse gas emissions, heavy metals, chemicals, and other pollutants.
- Reduce, reuse, recycle, and upcycle materials and resources.
- Conserve water.
- Increase the capacity of carbon sinks through re-vegetation.

Transform the Market through Design, Development, and Maintenance Practices

- Foster leadership in industry and professional practice.
- Use a systems-thinking, integrative and collaborative design approach.
- Use lifecycle analyses to inform the design process.
- Support local economies and sustainability policies.

Enhance Human Well-Being and Strengthen Community

- Reconnect humans to nature.
- Improve human health (physical, mental, and spiritual).
- Foster stewardship by providing education that promotes the understanding of natural systems, and recognizes the value of landscapes.
- Encourage cultural integrity and promote regional identity.
- Provide opportunities for community involvement and advocacy.

II. The SITES v2 Process

ELIGIBLE SITES: WHERE AND WHEN TO USE SITES V2

In this Rating System, a “site” is the physical location or land on which a “project” is developed. The SITES v2 Rating System applies to new construction projects as well as existing sites that include major renovations. There is no maximum size for a SITES project, but the minimum size is considered to be 2,000 square feet (185.8 square meters). For projects that were completed more than two years prior to SITES registration (i.e. completed by submitting an application and fee), the project team should closely examine the prerequisite and credit requirements to ensure that the associated documentation exists to prove compliance for certification.

The SITES v2 Rating System accommodates regional differences and various types of sites (e.g., urban, suburban, or rural locations; previously developed or undeveloped sites). Many benchmarks consider the site’s pre-existing condition and function in recommending performance criteria. While SITES can be applied worldwide, some references are specific to the United States; therefore, project teams in other countries are responsible for referencing and documenting comparable local resources.

The SITES v2 Rating System can apply to projects located on sites with or without buildings, including:

- Open spaces—local, state, and national parks; botanic gardens; arboretums
- Streetscapes and plazas
- Commercial—retail and office areas; corporate campuses
- Residential—neighborhoods or individual yards
- Educational/Institutional—public and private campuses; museums; hospitals
- Infrastructure
- Government
- Military
- Industrial

For sites that include buildings, the SITES v2 Rating System focuses on the area from the building skin outwards. For more details, see *Where to Start* on page xxiii.

The SITES program supports and encourages projects that plan to pursue simultaneous certification with the U.S. Green Building Council (USGBC) Leadership in Energy & Environmental Design (LEED) Green Building Rating Systems and the SITES v2 Rating System. For further guidance on the synergies and potential equivalences between the LEED and SITES rating systems, please visit the SITES website (www.sustainablesites.org).

HOW TO USE AND UNDERSTAND SITES V2

The SITES v2 Rating System consists of 18 prerequisites and 48 credits totaling 200 points for measuring project sustainability. Additionally, projects that employ innovative and exemplary performance strategies can receive bonus points (see Section 10: Innovation + Exemplary Performance). By providing performance measures rather than prescribing practices, SITES supports the unique conditions of each site and encourages project teams to be flexible and creative as they design and develop beautiful, functional, and regenerative sites appropriate for their context and intended use.

Prerequisites and credits in the SITES v2 Rating System are organized into 10 sections that follow typical design and construction phases. Achieving a sustainable site eligible for certification begins with proper site selection and site assessment, continues through site design and construction, and includes effective and appropriate operations and maintenance. SITES v2 concludes with an emphasis on education and performance monitoring in order to increase the knowledge base of site sustainability.

Prerequisite requirements must be met if a project is to be considered for certification. All credits are considered optional; however, a certain number of credit points must be approved for a project to achieve certification (see *Certification* on page xxvii). Not all credits will apply to every project, but the array of credits provides multiple opportunities to achieve certification.

A brief overview of the SITES v2 Rating System follows below. It aims to provide project teams with an understanding of the overarching goals of each section and how each relates to other areas.

Section 1: Site Context

Particular attention is placed on understanding the context of where a project is located and developed. SITES requires careful planning and the protection of existing, functioning natural features that are unique, critical, sensitive, or threatened, such as farmlands, floodplains, wetlands, and wildlife habitats. These features provide essential ecosystem functions for wildlife, site users, and the surrounding community.

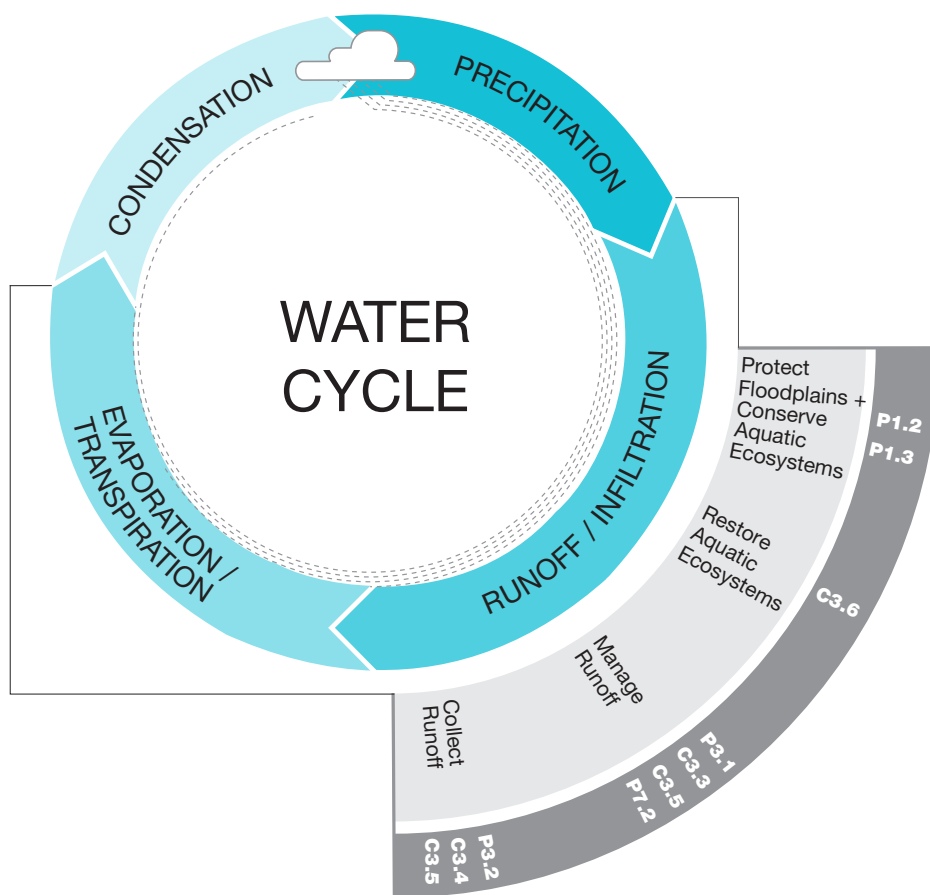
SITES considers previous uses of the site and rewards projects that are located on degraded sites because of the opportunity and, sometimes the urgency, to restore ecosystem services in these areas. Redevelopment also reduces pressure on undeveloped land, or greenfields. This section also looks beyond the site boundary to consider how the surrounding area can contribute to reducing pollution, improving human health and well-being, and supporting local economies and communities.

Section 2: Pre-Design Assessment + Planning

Before design begins, an integrated design team must conduct a comprehensive site assessment of existing physical, biological, and cultural conditions that will inform planning and design. This team must include experts in natural systems, design, construction, and maintenance, in addition to representatives of the community, the owners, and the intended site users.

Section 3: Site Design—Water

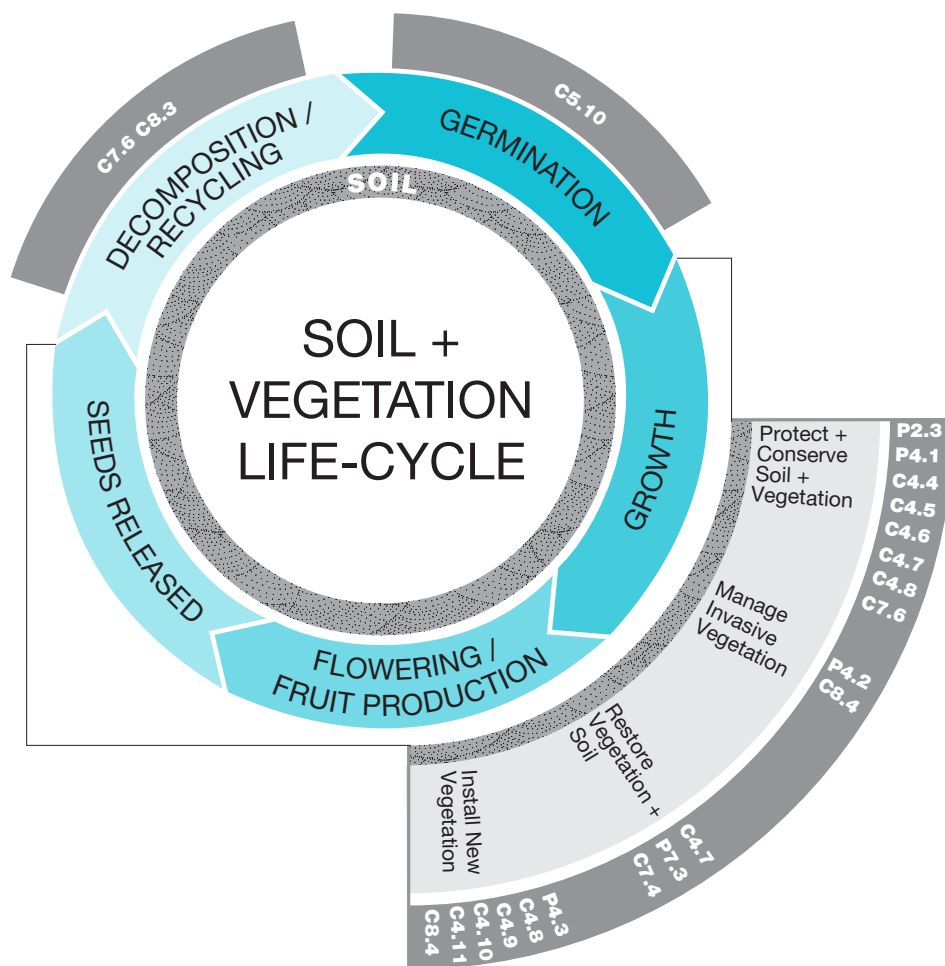
Natural systems are of critical value for their ability to store, clean, and distribute available water. This section encourages projects that are designed to conserve water, maximize the use of precipitation, and protect water quality. For example, a sustainable project may harvest rainwater on site and use it, rather than potable water, for irrigation and water features. The goal is to incorporate strategies and technologies that restore or mimic natural systems.



This diagram illustrates how prerequisites and credits in the SITES v2 Rating System relate to and support the processes of the natural water cycle, shown highlighted in the blue circle above. The bottom right shows the actions that SITES encourages in gray, while the corresponding prerequisite and credit numbers are shown in the dark gray bar.

Section 4: Site Design—Soil + Vegetation

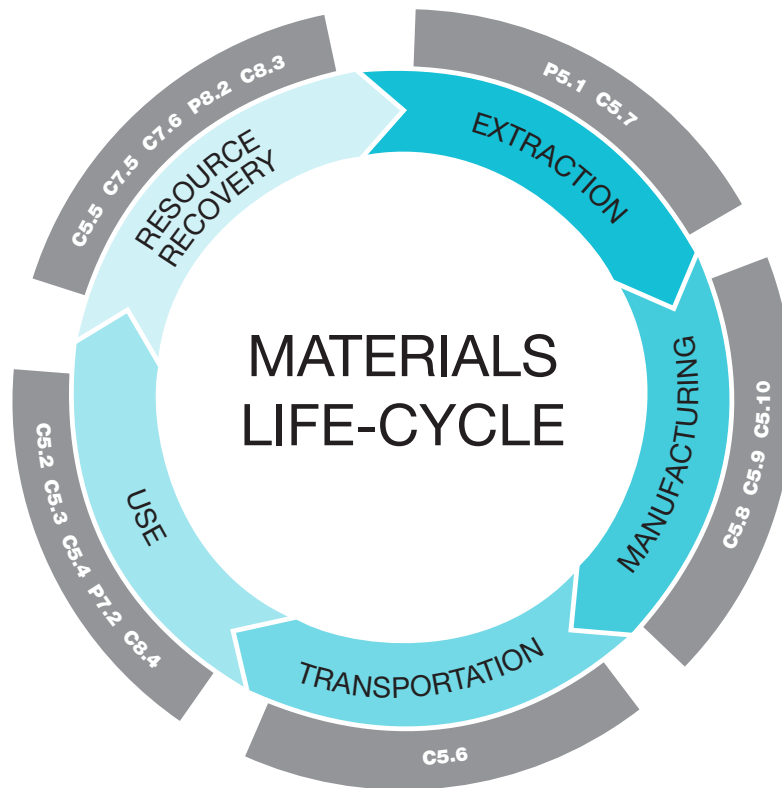
This section requires proper soil management as a design element and construction priority. In addition to serving as the foundation for robust vegetation, healthy soils filter pollutants and help prevent excess runoff, erosion, sedimentation, and flooding. Using appropriate vegetation, managing invasive plants, and restoring biodiversity (emphasizing native species) are some key strategies that have multiple environmental, economic, and social benefits. They can reduce or eliminate landscape irrigation, increase the quality of wildlife habitat, promote regional identity, and reduce maintenance needs.



This diagram illustrates how prerequisites and credits in the SITES v2 Rating System relate to and support the processes of the natural soil and vegetation life-cycle, shown highlighted in the blue circle above. The bottom right shows the actions that SITES encourages in gray, while the corresponding prerequisite and credit numbers are shown in the dark gray bar.

Section 5: Site Design—Materials Selection

Appropriate selection and use of materials can contribute to a project's ability to support and enhance ecosystem services on the site and wherever the material exists throughout its life-cycle. The demolition, selection, procurement, and use of materials in site design and construction present considerable opportunities to decrease the amount of materials sent to landfills, to preserve natural resources, to reduce greenhouse gas emissions, and to support the use of sustainable building products.



This diagram illustrates how prerequisites and credits in the SITES v2 Rating System, shown in dark gray, relate to and support the processes of the materials life-cycle, shown highlighted in the blue circle above.

Section 6: Site Design—Human Health + Well-Being

Any access to nature, whether in a park or natural area, or simply viewing green space during daily life, positively affects mental health and facilitates social connection. These effects are essential to healthy human habitat and extend to include positive physical health outcomes. This section promotes outdoor opportunities for physical activity, restorative and aesthetic experiences, and social interaction. It also encourages projects to address social equity in their design and development choices. The intent is to build stronger communities and create or renew a sense of environmental stewardship.

Section 7: Construction

Sustainable construction practices start with ensuring that contractors are aware of sustainability goals set in the initial design phase. Then, proper actions can be taken through the construction phase. This section encourages projects to protect air quality through low-emitting equipment, strive for a net-zero waste site, ensure healthy vegetation through soil restoration strategies, and protect receiving waters from polluted runoff and sedimentation.

Section 8: Operations + Maintenance

To produce a design and to meet performance goals that will conserve resources and reduce pollution and waste throughout the life of the project, work with a maintenance professional during the design phase. This section promotes maintenance strategies that maximize the site's long-term potential in providing ecosystem services. Strategies include reducing material disposal, ensuring long-term health of soil and vegetation, reducing pollution, conserving energy, and encouraging the use of renewable energy.

Section 9: Education + Performance Monitoring

This section recognizes projects for efforts made to inform and educate the public about the project goals and sustainable practices implemented in site design, construction, and maintenance. It also creates an incentive to monitor, document, and report the performance of the site over time in order to influence and improve the body of knowledge in site sustainability.

Section 10: Innovation or Exemplary Performance

This section encourages creativity and innovation in fulfilling prerequisite and credit requirements. It awards bonus points to projects that demonstrate exemplary performance above and beyond the targets established by one or more of the credits. SITES also supports innovation by awarding extra points to projects that develop or pursue sustainable practices or meet benchmarks for sustainable performance that are not currently addressed in the SITES v2 Rating System.

Credit Format

Throughout the SITES v2 Rating System, each section is given a shorthand title (e.g., *Pre-Design* stands for *Pre-Design Assessment + Planning*) and references to prerequisites and credits have been shortened to “P” or “C”, followed by the section number, credit number and title.

Example: *Pre-Design P2.1: Use an integrative design process*

Section	Prerequisite or Credit	Section Number	Credit Number	Title
Pre-Design	P	2	.1	Use an integrative design process

PREREQUISITES AND CREDITS

A project must satisfy all prerequisites to be considered for certification. SITES considers each credit optional, but a certain number of credit points are required for certification. See the section on *Certification* on page xxvii for more details. Information about each prerequisite and credit is presented in a standard format for simplicity and quick reference as follows.

Please note that this document contains an abbreviated version of the credits to serve as an introduction to SITES v2.

*These headings are excluded. For the complete resource, see the *SITES v2 Reference Guide* (www.sustainablesites.org).

Title previews the content of the prerequisite or credit and offers a general overview of the action to be taken.

Point level sets forth the range of points that can be earned by fulfilling the requirements of each credit. Prerequisites are required; therefore, they do not have a point range.

Intent describes the objective or benefit of the prerequisite or credit.

Requirements are the measures or benchmarks a project must meet to satisfy the prerequisite or achieve the credit. For certain credits, multiple thresholds are provided and point values reflect these incremental improvements. In some prerequisites and credits, specific pathways are outlined as *Cases*, *Options*, or *Methods* (see below).

Cases indicate how projects with particular pre-existing conditions should document compliance.

Options allow project teams to choose actions to satisfy credit requirements. Options are allotted credit value commensurate with their requirements.

Methods indicate techniques for achieving the credit requirements, although all methods result in the same number of points. This term appears only in *HHWB Credit 6.8: Reduce light pollution*.

Submittal documentation* specifies what a project must submit to prove compliance with the requirements of the prerequisite or credit. This documentation may include a site plan detailing specific criteria, calculations demonstrating a site's performance, or a narrative explaining procedures undertaken to meet the requirements. Consistent, clear documentation is critical to prove compliance.

Documentation guidance* offers additional tools, procedures, or advice for assessing a requirement and submitting documentation. To assist projects with documentation for certain SITES credits, hypothetical project examples demonstrate the information that must be shown on maps and site plans submitted for certification review (See *Where to Start—Site Plans and Maps* in the *SITES v2 Reference Guide* for more background on these example sites).

Recommended strategies are site practices that a project team can use to fulfill the prerequisite or credit. The technologies and strategies listed in this section are not all-inclusive, and SITES encourages projects to use creative site-specific solutions to meet the requirements of a prerequisite or credit.

Economic and social benefits* describe the value of ecosystem services that a prerequisite or credit could provide. Economic benefits may take the form of avoided costs, such as lower healthcare costs due to improved air and water quality; reduced infrastructure costs because rainwater capture lessens pressure on storm sewers; or increased property values. Social benefits may take the form of improved physical outcomes (e.g., weight loss); reduced symptoms of depression and aggression; or increase in performance on creative or problem-solving tasks. The benefits listed per credit are only examples and not all-inclusive. For further information on the benefits and value of sustainable sites, visit www.sustainablesites.org.

Definitions* clarify the meaning of certain terms used in descriptions of each prerequisite or credit. A term that is defined will be underlined. Some definitions will link to a particular prerequisite or credit. A glossary is provided at the end of the reference guide citing each prerequisite and credit in which a term appears.

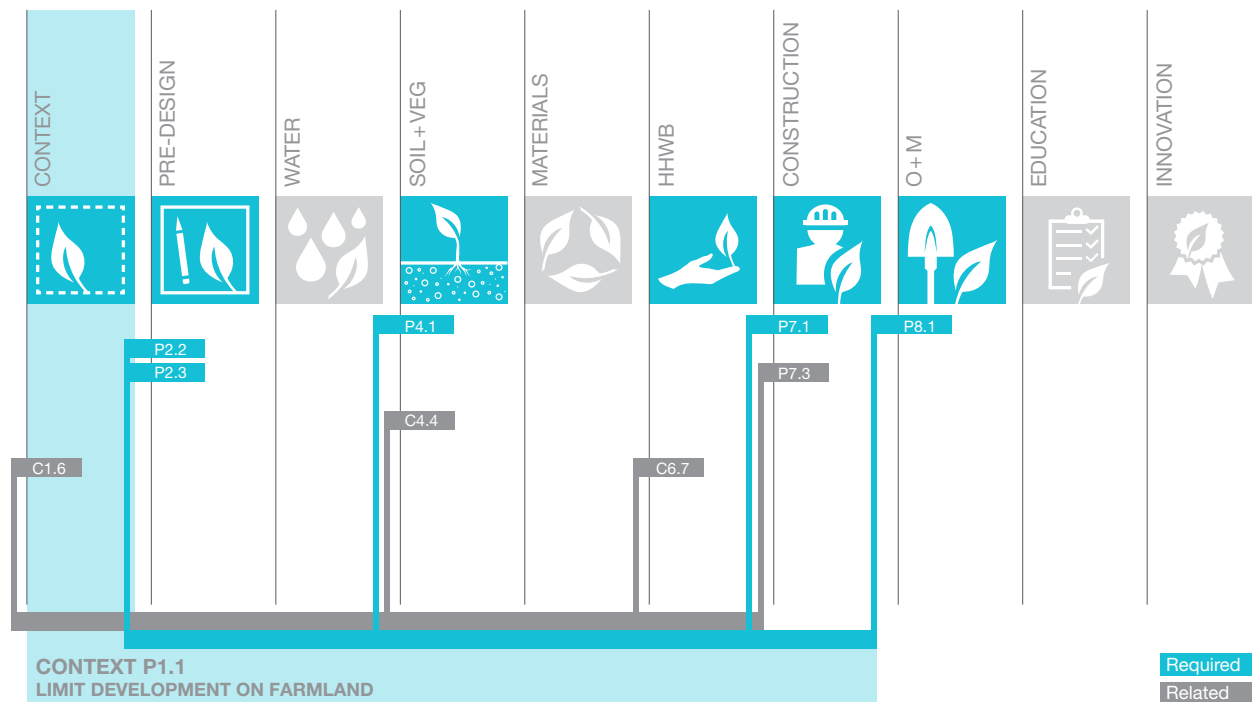
Resources* provide additional guidance, information or research findings. All efforts have been made to ensure web links are current at the time of publishing, but the constantly changing nature of Internet information means they may not remain up to date indefinitely. For any SITES credits adapted from USGBC LEED credits, the applicable LEED credits are noted as the first bullet in this section.

Links to other SITES prerequisites and credits* demonstrate the interrelationships and synergies within the rating system. This graphic found in the *SITES v2 Reference Guide* is intended to guide project teams to higher levels of sustainability (through increased credit achievement) by outlining the connections between credits and performance criteria. Prerequisites and credits have a graphic (example below) that demonstrates *Required* and *Related* Links between other prerequisites and credits.

Required Links refer to any mandatory cross-credit documentation that teams must submit for a project to satisfy the requirements and intent of a given prerequisite or credit. In the graphic, *Required Links* are shown in blue.

Related Links indicate other prerequisites or credits that might benefit from strategies used for a given credit or prerequisite. In the graphic, *Related Links* are shown in gray.

LINKS TO OTHER SITES PREREQUISITES AND CREDITS



WHERE TO START

Integrated Design Team

An integrative design process is a critical component of the SITES v2 Rating System. It requires project team members of diverse disciplines (i.e., knowledgeable about natural systems, design, construction, and maintenance) to engage with each other, the client or owner, and local stakeholders and experts. This inclusive, collaborative, goal-driven approach is aimed at achieving high-performance project design and widespread buy-in from all parties involved. An integrated design team must be formed before beginning site design (see *Pre-Design P2.1: Use an integrative design process*) and all participants should be included in the initial review of the rating system and in determining the associated performance goals of the project.

SITES Scorecard

The SITES scorecard is a list of all the SITES v2 prerequisites and credits and their respective points. This tool helps projects note their initial goals and their progress in terms of the required prerequisites as well as the credits that the project team intends to pursue. The scorecard is a concise summary of a project's credit goals, and SITES requires submission of the scorecard for certification review. Please visit www.sustainablesites.org to download the SITES v2 scorecard.

Prerequisites

There are 18 prerequisites in the SITES v2 Rating System, and a project must satisfy all of them in order to be considered for certification. Prerequisites represent a baseline performance for any SITES certified project. Projects must review and understand prerequisite requirements to assess whether their project is eligible, particularly those found in *Section 1: Site Context* and *Section 2: Pre-Design Assessment + Planning*.

The prerequisites are as follows:

Context P1.1: Limit development on farmland

Context P1.2: Protect floodplain functions

Context P1.3: Conserve aquatic ecosystems

Context P1.4: Conserve habitats for threatened and endangered species

Pre-Design P2.1: Use an integrative design process

Pre-Design P2.2: Conduct a pre-design site assessment

Pre-Design P2.3: Designate and communicate Vegetation and Soil Protection Zones

Water P3.1: Manage precipitation on site

Water P3.2: Reduce water use for landscape irrigation

Soil+Veg P4.1: Create and communicate a soil management plan

Soil+Veg P4.2: Control and manage invasive plants

Soil+Veg P4.3: Use appropriate plants

Materials P5.1: Eliminate the use of wood from threatened tree species

Construction P7.1: Communicate and verify sustainable construction practices

Construction P7.2: Control and retain construction pollutants

Construction P7.3: Restore soils disturbed during construction

O+M P8.1: Plan for sustainable site maintenance

O+M P8.2: Provide for storage and collection of recyclables

Site Assessment

The site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is a comprehensive data-gathering exercise in which the integrated design team assesses and maps the existing conditions and characteristics of the project site to help explore options for sustainable outcomes. This task informs future decisions about site design, construction, operations, and maintenance. SITES considers the site assessment as a roadmap to better understanding the rating system.

Vegetation and Soil Protection Zones (VSPZs)

The rating system requires projects to conserve existing healthy natural resources that are critical, rare, or sensitive, such as prime farmland, within Vegetation and Soil Protection Zones (see *Pre-Design P2.3: Designate and communicate Vegetation and Soil Protection Zones*). To prevent damage to vegetation, soil structure, and function, teams should identify these areas during the pre-design phase and protect them throughout construction according to VSPZ requirements. Not all sites will contain a VSPZ, because VSPZs are based on existing healthy site features.

Plans and Punchlist

Several prerequisites require projects to consider and document how a site will operate during the construction and maintenance phases. Teams must communicate the SITES goals for the project to all members including contractors and operations and maintenance personnel. This documentation also addresses requirements of other SITES prerequisites and credits.

Soil Management Plan (*Soil+Veg P4.1: Create and communicate a soil management plan*)

Teams should complete this plan in the design phase. It details actions required for soil protection and restoration during the construction phase of the project.

SITES Punchlist (*Construction P7.1: Communicate and verify sustainable construction practices*)

Prior to the pre-construction meeting, a team must develop a punchlist that details communication and accountability between team members and ensures that SITES goals are met throughout construction.

Site Maintenance Plan (*O+M P8.1: Plan for sustainable site maintenance*)

Created by the integrated design team (including a team member knowledgeable in site maintenance), this plan intends to inform and structure maintenance strategies that ensure long-term site sustainability. It serves as a foundation for a more extensive operations and maintenance manual.

Defining a SITES Project Boundary

The SITES project boundary defines the limits of the project submitted for SITES certification. All maps or plans provided as credit documentation must reflect this SITES project boundary.

Generally, the SITES project boundary must be the legal property boundary. For projects located on publicly owned land or campuses that do not have internal property lines, the SITES project boundary may use the legal limits of the campus or, for SITES purposes, define an alternative boundary that is wholly contained within the legally owned site. It may not exclude sections of land to create boundaries in unreasonable shapes for the sole purpose of complying with prerequisites or credits. Other criteria for defining the boundary are as follows:

- All contiguous land that is associated with and supports normal site operations must be included in the SITES project boundary, including all land disturbed, protected, or conserved during the project. The SITES project boundary must not contain non-contiguous parcels except for parcels separated by public rights-of-way.

- All activities (i.e., conservation, restoration, construction, maintenance) must occur within the SITES project boundary and be consistently accounted for in prerequisite and credit documentation.
- Existing land uses and buildings may be included, but a majority of the project's total area should either be recently completed (within two years of SITES registration), planned as new construction, or a major renovation of an existing site.
- The entire area contained within the project boundary must be held by the same ownership, property manager, or developer, or maintained under one operating body.

Special Cases

Regularly occupied buildings are buildings where occupants (e.g., workers, students, residents) are inside for extended periods of time. In situations where regularly occupied buildings are located within the SITES project boundary:

- SITES certification generally concerns the area from the building skin outward; therefore most materials and spaces within a regularly occupied building footprint should be excluded from SITES calculations. In general, this division occurs at the outside-most material layer of the building enclosure.
- Exterior building materials must be included if they are part of an area (e.g., green roof, living wall) being used for SITES credits. If the project team elects to include exterior building materials, they must consistently account for them in all applicable SITES prerequisites and credits.

In some cases, land and facilities outside the SITES project boundary may be included in submittals:

- Submittals for all credits within *Section 3: Site Design—Water* may include an offsite catchment area, defined as land outside the SITES project boundary.
- The project SITES boundary may exclude a construction staging area that includes previously developed land used solely for construction staging and materials sorting. However, all credit calculations within *Section 7: Construction* must include the staging area.
- A project may use facilities such as parking lots that are outside the SITES project boundary when they serve the project but are not a part of the SITES construction scope.

Base Calculation Guidance

SITES asks projects seeking certification to provide base calculations in multiple credit submittals, and these numbers should be used consistently across all prerequisites and credits.

Total site area represents the entire area within the SITES project boundary, and may be presented in square feet, acres, or square meters (for projects outside the United States). The total site area should exclude the area of regularly occupied buildings, unless a portion (e.g., green roof) counts toward SITES credits.

Vegetated area describes all portions of the sites that will support vegetation.

Existing vegetated area is the pre-project area within the SITES project boundary that supports vegetation, including any invasive vegetation, as noted in credits such as *Pre-Design P2.2: Conduct a pre-design site assessment*, and *Soil+Veg C4.4: Conserve healthy soils and appropriate vegetation*.

Final vegetated area represents the entire area within the SITES project boundary that will support vegetation after the project is complete as noted in credits such as *Water P3.2: Reduce water use for landscape irrigation*, *Soil+Veg C4.6: Conserve and use native plants*, and *Construction P7.3: Restore soils disturbed during construction*.

Total materials cost represents the total cost of all materials used in the SITES project. The *Materials Worksheet* is available to registered project teams to assist in tracking and calculating project materials costs.

Total site users number represents the typical number of simultaneous users on a site during the busiest time period, excluding rare or singular events. Site users are defined as individuals who are expected to occupy, work at, or pass through the site. Users may visit the site regularly or only periodically. Site users will range in age, ethnicity, and socio-economic status, but all users' needs should be considered.

For projects with regularly occupied buildings, the total number of site users should include both full-time equivalent (FTE) occupants and either calculated or estimated temporary occupants. FTE occupants are typically the users of a site during a standard eight-hour period. An FTE occupant has a value of 1.0, while a temporary occupant has a value based on his or her hours per day divided by eight (occupant value = occupant hours/8 hours). If there are multiple shifts, use only the highest volume shift in the FTE calculation but consider shift overlap when determining peak site users.

For projects with more transient populations, reasonable methods of calculating estimated site users are acceptable with SITES approval.

SITES recommends that the integrated design team work collaboratively to estimate the average number of users likely to be on site. SITES' suggested methodology includes the following metrics:

- Consider daily use patterns and recurring events. If an event occurs more than 10 times per year, the number of users at those events should be considered.
- Site visitors present for two hours or less need not be factored into the number of total site users.
- Consider overlapping use patterns to estimate the total simultaneous site users.

Worksheets and Calculators

Registered projects receive access to specific worksheets and calculators mentioned throughout the SITES v2 Rating System (e.g., *Vegetation Worksheet*, *Native Plants Calculator*, *Materials Worksheet*). SITES provides these tools to assist project teams in tracking and calculating data consistently throughout the design and development process.

SITES Maps and Plans

For consideration for SITES certification, projects must provide a pre- and post-construction base map of the site showing the project's key components. Credit documentation must use this information consistently as it helps demonstrate compliance with SITES prerequisites and credits. All additional maps or plans provided as supporting credit documentation must reflect this base map information and should also follow these guidelines:

- Include the SITES project ID number, project name, relevant credit or prerequisite, location, and date of preparation
- Choose colors and images that clearly communicate the intent of the project
- Include a legend if icons, hatch patterns, or color palettes are used
- Provide a scale and north arrow
- Clearly define the SITES project boundary on all maps provided for review
- Clearly define any Vegetation and Soil Protection Zones (VSPZs)

CERTIFICATION

The SITES v2 Rating System is a 200-point system with four certification levels of achievement.

The 18 prerequisites within the rating system are required and therefore are not assigned a point value. Credits are optional and assigned a point value or a range of possible points, which provides projects additional flexibility in selecting a target certification level that is appropriate and achievable.

Certification under the SITES v2 Rating System is awarded according to the following scale:

SITES v2 Certification Levels:	200 Points Total
Certified	70 points
Silver	85 points
Gold	100 points
Platinum	135 points

UPDATES AND ADDENDA

This is the first edition of the *SITES v2 Rating System: For Sustainable Land Design and Development*. The prerequisites and credits may need to be updated and amended as the science and body of knowledge on site sustainability improves and evolves. SITES will make updates and addenda available on its website (www.sustainablesites.org).

For more insight and an in-depth view of the *SITES v2 Rating System*, please see the *SITES v2 Reference Guide*, available for purchase at www.sustainablesites.org.



SECTION 1

SITE CONTEXT

PREREQUISITE / CREDIT	TITLE	POINTS
Context P1.1	Limit development on farmland	Required
Context P1.2	Protect floodplain functions	Required
Context P1.3	Conserve aquatic ecosystems	Required
Context P1.4	Conserve habitats for threatened and endangered species	Required
Context C1.5	Redevelop degraded sites	3-6 points
Context C1.6	Locate projects within existing developed areas	4 points
Context C1.7	Connect to multi-modal transit networks	2-3 points



Prerequisite 1.1: Limit development on farmland

Required

INTENT

Conserve the most productive farmland for future generations by protecting prime farmland, unique farmland, and farmland of statewide or local importance.

REQUIREMENTS

The requirements below apply exclusively to areas of the site that contain healthy soils, as identified in the site assessment (*see Pre-Design P2.2: Conduct a pre-design site assessment*), or areas of the site that have not been previously developed.

Refer to prime farmland, unique farmland, farmland of statewide importance, or farmland of local importance as defined by the U.S. Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.7 and identified in the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) soil survey (or local equivalent for projects outside the United States).

Case 1: Sites without farmland soils

- Locate the project on a site that does not contain soils defined by the NRCS (or local equivalent for projects outside the United States) as prime farmland, unique farmland, or farmland of statewide or local importance.

Case 2: Sites with farmland soils—VSPZs

- Designate at least 95 percent of all healthy soils on site defined by the NRCS (or local equivalent for projects outside the United States) as prime farmland, unique farmland, and farmland of statewide or local importance in Vegetation and Soil Protection Zones (VSPZs) (*see Pre-Design P2.3: Designate and communicate VSPZs*).
- Ensure the section of the site maintenance plan (*see O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of the VSPZs.

Case 3: Sites with farmland soils—Mitigation

A site containing soils defined by the NRCS (or local equivalent for projects outside the United States) as prime farmland, unique farmland, or farmland of statewide or local importance is eligible for Case 3 if it is not located in an area designated by the municipality, county, or state as an agricultural conservation or rural conservation zone, and at least one of the following applies:

- Locate the project on an infill site (this action also satisfies the requirements of *Context C1.6: Locate projects within existing developed areas*).
- Locate the project within an area that has been designated by the municipality, county, or state as a “desired development zone,” a “preferred growth area,” or an “urban growth boundary,” using a comprehensive planning process (e.g., assessing future agricultural needs, affordable housing opportunities, transportation corridors, desires for density).

Section 1: Site Context

P1.1



Mitigation requirements: 100 percent of prime farmland, unique farmland, or farmland of statewide or local importance soils lost to development must be mitigated as follows:

- The purchase of agricultural conservation easements* must provide permanent protection from development on land with comparable soils at a 2:1 ratio (i.e., two acres or 0.81 hectares of easement for every one acre or 0.40 hectares of farmland soils lost to development).
 - Comparable soils must be productive farmland soils defined by the NRCS (or local equivalent for projects outside the United States) as prime farmland, unique farmland, or farmland of statewide or local importance
- All off-site mitigation (i.e., purchase of easements) must post-date SITES registration and must be located within 100 miles (160.93 kilometers) of the site.
- Up to 15 percent of the on-site soils defined by the NRCS (or local equivalent for projects outside the United States) as prime farmland, unique farmland, or farmland of statewide or local importance may be excluded from the mitigation requirements if it is permanently dedicated for on-site food production (see *HHWB C6.7: Provide on-site food production*). The minimum size of land designated for on-site food production must be at least 2,000 square feet (185.81 square meters).

* Criteria for agricultural conservation easements:

- > Must be used for the purpose of keeping land available for farming in perpetuity
- > Must maintain soil health (i.e., must be restored, vegetated with a perennial crop, or farmed with restorative agriculture practices that limit damage to soil and waterways)
- > Must allow (though not require) continued farming of the land
- > Refer to agricultural conservation easements proposed by the American Farmland Trust (or local equivalent for projects outside the United States)

RECOMMENDED STRATEGIES

- Refer to the NRCS Web Soil Survey (websoilsurvey.nrcs.usda.gov/app/HomePage.htm), NRCS SSURGO soil surveys (soildatamart.nrcs.usda.gov), and NRCS soil survey maps from local Soil and Water Conservation District offices (or local equivalent for projects outside the United States) to determine if soils designated as prime farmland, unique farmland, or farmland of statewide or local importance are present on site.
- If farmland soils are present on site, consider relocating project development to an alternate site. If developing on an alternate site is not possible, locate project development within the site so as to conserve prime farmland soils and minimize disturbance due to construction activity.



Prerequisite 1.2: Protect floodplain functions

Required

INTENT

Protect floodplain functions (e.g., storage, habitat, water quality benefits) by limiting new development within the 100-year floodplain of all types of waterways and watercourses.

REQUIREMENTS

Case 1: Sites without floodplain

- Locate the project on a site that does not contain any land within a 100-year floodplain as defined and mapped by the Federal Emergency Management Agency (FEMA) or a local or state floodplain management agency map, whichever is more stringent (or local equivalent for projects outside the United States).
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete, including documentation that the site is not located within a 100-year floodplain.

Case 2: Previously developed and brownfield sites within floodplain

- Locate the project on a previously developed or brownfield site.
 - Demonstrate how the proposed development or redevelopment activities within the floodplain mitigate and improve existing floodplain conditions. Such activities must maintain or increase existing floodplain storage, improve water quality, and be designed so as not to be damaged by floods. Activities must not increase flood elevations.
 - Comply with the National Flood Insurance Program (NFIP) requirements for developing any structures within the 100-year floodplain (or local equivalent for projects outside the United States).
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents the location of the 100-year floodplain.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of the floodplain functions.

Case 3: Greenfield sites within floodplain

- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents the location of the 100-year floodplain.
- Designate Vegetation and Soil Protection Zones (VSPZs) for 90 percent of the land within the 100-year floodplain (see *Pre-Design P2.3: Designate and communicate VSPZs*).
- Demonstrate that any minimal impact site development within the VSPZ improves existing floodplain conditions, which means it maintains or increases existing floodplain storage, improves water quality, is designed so as not to be damaged by floods, and does not singularly or cumulatively increase flood elevations.
- Comply with the National Flood Insurance Program (NFIP) requirements for developing any structures within the 100-year floodplain (or local equivalent for projects outside the United States).
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of the VSPZs and the floodplain functions.

Section 1: Site Context

P1.2



RECOMMENDED STRATEGIES

- Design the site to limit development and disturbance within the 100-year floodplain.
- Design new development, such as a trail or boardwalk, in such a way that it will not be damaged by flooding or result in a negative impact to existing floodplain storage or conveyance.
- Re-establish areas of vegetated floodplain on brownfield or previously developed sites, and manage invasive plant species where necessary.
- Carefully situate new development to avoid causing erosion and directing sediment and potential contaminants from stormwater runoff into receiving waters.



Prerequisite 1.3: Conserve aquatic ecosystems

Required

INTENT

Conserve and protect aquatic ecosystems, including wetlands and deepwater habitats that provide critical ecosystem functions for fish, other wildlife, and people.

REQUIREMENTS

Aquatic ecosystems include wetlands, deepwater habitats, and areas classified in accordance with the Classification of Wetlands and Deepwater Habitats of the United States as follows:

- Marine—Tidal wetlands, shorelines, mudflats, reefs
- Estuarine—Bays, lagoons, marshes
- Riverine—Streams, rivers (associated floodplains and their riparian buffer)
- Lacustrine—Lakes, ponds (associated shorelines and their riparian buffer)
- Palustrine—Non-tidal wetlands, seeps, springs, vernal pools, seasonal wetlands

Wetlands are defined in the U.S. Clean Water Act and delineated according to the appropriate regional supplement to the U.S. Army Corps of Engineers delineation manual (see Resources section). The boundaries of other aquatic ecosystems are defined by the ordinary high water mark (OHWM), which is also explained in Corps reports (see Resources section). Use local equivalent for projects outside the United States.

Case 1: Sites without aquatic ecosystems

- Locate the project on a site that does not contain any aquatic ecosystems, including isolated wetlands.
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and demonstrates that no aquatic ecosystems, including isolated wetlands, are located on site.

The following features are not considered aquatic ecosystems that must be protected for the purposes of this prerequisite:

- A previously developed site, unless the site contains naturally occurring wetlands, deepwater habitats, or previously constructed mitigation wetlands
- Human-made water bodies (e.g., industrial mining pits, concrete-lined canals, stormwater retention ponds) that lack natural edges and floors or native ecological communities in the water and along the edge.
- Human-made linear wetlands that result from the interruption of natural upland drainages by existing rights-of-way (except aquatic ecosystems that have been relocated by a right-of-way)
- Aquatic ecosystems including wetlands that are incidental results of development activity and have been rated “poor” for all measured wetland functions. A qualified professional using a method that is accepted by regional, state, or federal permitting agencies must perform an aquatic ecosystem quality assessment.

Case 2: Sites with naturally occurring aquatic ecosystems

- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents any aquatic ecosystems, including isolated wetlands, located on site.
- Delineate the full geographic extent, within the project site boundary, of the aquatic ecosystems according to U.S. Army Corps of Engineers guidance.

Section 1: Site Context

P1.3



- Designate Vegetation and Soil Protection Zones (VSPZs) for wetland and deepwater habitat buffer designations as defined below (see *Pre-Design P2.3: Designate and communicate VSPZs*). Restoration activities are encouraged within the limits of VSPZs.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and demonstrates how protection or restoration of the aquatic ecosystems will maintain their health long term. Indicate how maintenance and monitoring activities will ensure sustained proper aquatic function.
- Wetland and deepwater habitat buffers are designated by local, state, or federal regulations applicable to the jurisdiction in which the site is located, or as follows, whichever is greater:

Classification	Aquatic ecosystem habitat buffer designation
Marine	200 feet (60.96 meters) landward from normal high tide line
Estuarine	100 feet (30.48 meters) landward from the normal high tide line
Riverine	Tidal—100 feet (30.48 meters) landward from the normal high tide line
	Lower and upper perennial—100 feet (30.48 meters) from the ordinary high water mark or the 100-year floodplain, whichever is greater
	Intermittent and unknown perennial—50 feet (15.24 meters) from the ordinary high water mark or the 100-year floodplain, whichever is greater
Lacustrine	Water body greater than 50 contiguous acres (20.23 hectares)—100 feet (30.48 meters) landward from the normal water edge
	Water body less than 50 contiguous acres (20.23 hectares)—50 feet (15.24 meters) landward from the normal water edge
Palustrine	100 feet (30.48 meters) landward from the delineated edge of the delineated wetland

Note: An existing aquatic ecosystem cannot be utilized for primary water quality treatment. Stormwater management design must not impact existing aquatic ecosystem hydrology and features.

Case 3: Sites with naturally occurring poor quality aquatic ecosystems

This option is only available for naturally occurring aquatic ecosystems that have been rated “poor” for measured functions, including hydrologic function, vegetation, and habitat. A qualified professional using a method that is accepted by regional, state, or federal permitting agencies must perform the aquatic ecosystem quality assessment.

- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents any aquatic ecosystems, including isolated wetlands, located on site.
- Delineate the full geographic extent of the aquatic ecosystem, within the project site boundary, using the U.S. Army Corps of Engineers guidance (see Resources section).
- Demonstrate how the aquatic ecosystems’ functions will be protected, restored, and maintained for projects that will encroach on the required buffer of naturally occurring, poor quality aquatic ecosystems.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and demonstrates protection or restoration of the aquatic ecosystems to maintain their health long-term. Indicate how maintenance and monitoring activities will ensure sustained proper aquatic function.

Section 1: Site Context

RECOMMENDED STRATEGIES

- During the site selection process, give preference to developing sites that do not contain aquatic ecosystems, such as wetlands or deepwater habitats.
- Design the site to minimize disruption to existing wetlands or deepwater habitats.
- If the project site boundary is directly adjacent to an off-site aquatic ecosystem, an on-site buffer may be implemented to protect all measured functions and the long-term health of the aquatic ecosystem.

P1.3





Prerequisite 1.4: Conserve habitats for threatened and endangered species

Required

INTENT

Protect ecosystem function by avoiding development of areas that contain habitat for plant and animal species identified as threatened or endangered.

REQUIREMENTS

Case 1: Brownfields and previously developed sites

- For all natural areas greater than 2,000 contiguous square feet (185.81 square meters):
 - As part of the pre-design site assessment (*Pre-design P2.2: Conduct a pre-design site assessment*), identify whether the site is in the range of potential habitats for any plant or animal species on U.S. federal or state threatened or endangered lists or on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as critically endangered (CR) or endangered (EN).
 - Designate the full extent of habitats for threatened or endangered species on the site as Vegetation and Soil Protection Zones (VSPZs) (see *Pre-Design P2.3: Designate and communicate VSPZs*).
 - Protect all listed animals and plants from damage or removal. Construction activities for minimal impact site development, and restoration and maintenance activities within VSPZs shall only occur during seasons when the animal species is not present.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and details the process for avoiding impacts to threatened and endangered species and their habitats during site maintenance.

Case 2: Greenfield sites

- As part of the pre-design site assessment (*Pre-design P2.2: Conduct a pre-design site assessment*), identify whether the site is in the range of potential habitats for any plant or animal species on U.S. federal or state threatened or endangered lists or on the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as critically endangered (CR) or endangered (EN).
- If the site is in the range of any threatened or endangered plant or animal species, conduct a habitat assessment for each identified species.
- Designate the full extent of habitats for threatened and endangered species on the site as VSPZs (see *Pre-Design P2.3: Designate and communicate VSPZs*).
- Protect all listed animals and plants from damage or removal. Construction activities for minimal impact site development and maintenance activities within VSPZs shall only occur during seasons when the animal species is not present. Restoration activities may occur within this zone to increase the quality of the habitat.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and details the process for avoiding negative impacts to threatened and endangered species and their habitats during site maintenance.

Section 1: Site Context

RECOMMENDED STRATEGIES

- During the site selection process, channel development to sites that do not include habitat for threatened or endangered plant and animal species.
- Design the site to minimize disruption to existing habitats.
- Design to allow species connectivity (habitat corridors) through the site and to adjacent sites.

P1.4





Credit 1.5: Redevelop degraded sites

3–6 points

INTENT

Protect ecosystem function, reduce pressure on undeveloped land, reduce resource consumption, and restore ecosystem services to damaged sites by channeling development to urban and previously developed areas.

REQUIREMENTS

Case 1: Previously developed sites

3 points

- Redevelop a previously developed site.
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents the percent of total site area that is previously developed.

Case 2: Brownfield sites

6 points

- Redevelop a brownfield site and remediate site contamination such that the controlling public authority approves the protective measures or cleanup process as effective, safe, and appropriate for the planned use of the site. All investigations and evaluations must be conducted by an environmental professional, as defined by the U.S. EPA 40 CFR 312.10 b (or local equivalent for projects outside of the United States).
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents the site's status as contaminated or defined as a brownfield.

RECOMMENDED STRATEGIES

- 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 where appropriate.
- Consult available local and state government brownfield databases to find brownfield properties.



Credit 1.6: Locate projects within existing developed areas

4 points

INTENT

Reduce development impacts, support local economy, and improve human health and well-being by selecting sites within existing developed areas.

REQUIREMENTS

Locate the project on a site that meets all of the following criteria:

- An infill site within 500 feet (152.4 meters) of existing publicly provided water and wastewater infrastructure
- Close proximity to basic services so that at least one entrance to the project is within a 0.5-mile (0.8-kilometers) walking distance of at least seven publicly available basic services. (Refer to the list of basic services in the Glossary):
 - Each basic service must have a separate exterior entrance, and no more than half of the minimum number can be situated in a single building or under a common roof.
 - No more than two basic services of each type may be counted (e.g., if five restaurants are within walking distance, only two may be counted).
 - A single retail store of any type may be counted only once even if it sells products associated with multiple-use types.

RECOMMENDED STRATEGIES

- During the site selection process, give preference to sites that are close to existing water and wastewater infrastructure, or properties within developed areas that have pedestrian access to a variety of existing services.
- For pedestrian safety along urban roads with speeds of 40 miles (64.37 kilometers) per hour or higher, design a buffer between the road and the sidewalk.
 - The width of a sidewalk depends primarily on the number of pedestrians who are expected to use the sidewalk at a given time; high-use sidewalks should be wider than low-use sidewalks.
 - A sidewalk width of five feet (1.52 meters) is needed for two adult pedestrians to comfortably walk side-by-side. This measurement should be the minimum width of all planned sidewalks.



Credit 1.7: Connect to multi-modal transit networks

2–3 points

INTENT

Improve human health and reduce pollution by selecting a site that connects to pedestrian, bicycle, and mass-transit networks.

REQUIREMENTS

Option 1: Pedestrian and bicycle network

2 points

- Locate the project on a site that is accessible to pedestrians with the following planned or existing features:
 - Continuous sidewalk and crosswalk network, trail network, or a combination that extends at least one mile (1.61 kilometers) in radial distance from a project entrance
- And, locate the project on a site that is accessible to bicyclists with one of the following planned or existing features:
 - A street with bicycle lanes or shared lane markings (SLMs) on both sides that connect directly to a project entrance
 - A bicycle network located no further than a 0.75-mile (1.2-kilometer) bicycling distance from a project entrance and spanning at least five continuous miles (8.05 kilometers) in length

In the case of planned facilities, show that the relevant agency has committed to provide the designated facility within two years of project completion.

Option 2: Transit network

3 points

- Locate the project on a site with existing or planned transit service so that:
 - At least one project entrance is within a 0.25-mile (0.4-kilometer) walking distance of bus or streetcar stops, or within a 0.5-mile (0.8-kilometer) walking distance of rapid transit stops, passenger rail stations, or ferry terminals
 - Transit service at those stops in aggregate meets the needs of the site users

In the case of planned service, show that the relevant transit agency has committed to provide the transit service within two years of project completion.

RECOMMENDED STRATEGIES

- During site selection, give preference to areas that are served by existing pedestrian, bicycle, and transit networks.
- Examine transportation and transit agency plans for new facilities or services within two years of project completion. Establishing relationships with agencies responsible for pedestrian, bicycle, and transit systems early in a project's planning often can help with documentation required for SITES certification.
- Perform a transportation survey of future site users to identify transportation needs.



SECTION 2

PRE-DESIGN ASSESSMENT + PLANNING

PREREQUISITE / CREDIT	TITLE	POINTS
Pre-Design P2.1	Use an integrative design process	Required
Pre-Design P2.2	Conduct a pre-design site assessment	Required
Pre-Design P2.3	Designate and communicate Vegetation and Soil Protection Zones (VSPZs)	Required
Pre-Design C2.4	Engage users and stakeholders	3 points

Prerequisite 2.1: Use an integrative design process

Required

P2.1



INTENT

Optimize site performance by identifying and executing synergistic opportunities across different disciplines throughout all phases of design and construction.

REQUIREMENTS

Projects must complete all of the following steps for prerequisite achievement:

1. Form an integrated design team

- The integrated design team should include, at minimum, the following roles:
 - Owner and/or client
 - Professionals knowledgeable in design, construction, and maintenance
 - Professionals knowledgeable in sustainable practices
 - Professionals with expertise in vegetation, water, soils, landscape ecology, materials, and human health and well-being, selected to meet the unique constraints and opportunities of the project and its site

2. Develop a collaborative communication process

- Develop an agreed upon communication method for team members. The method should be collaborative and allow the viewpoints and perspectives of all members to be fully considered in the decision-making process.
- Designate a team facilitator to be responsible for overseeing and ensuring a collaborative communication process.

3. Identify project sustainability principles and performance goals (see *O+M P8.1: Plan for sustainable site maintenance*)

- Identify the principles and performance goals of the project (both short- and long-term). Include an associated timeline and specific performance measures for each goal to determine when it has been achieved.
- Designate specific team members to track project goals throughout the development process.

4. Incorporate the sustainability principles and performance goals into a program plan

- Develop a program plan that at minimum includes the following information:
 - The unique characteristics, opportunities, and constraints of the site
 - General project parameters, such as the scope, budget, implementation schedule, purpose, and design intent of the project
 - A diagram or description of the intended function, arrangement, and relationship of desired features and their approximate dimensions
- Describe how the sustainability principles and performance goals will be incorporated into the design.

5. Identify stakeholders and site user groups

- Identify project stakeholders.
- Identify the full range of potential site users. List the primary and secondary user groups.

Section 2: Pre-Design Assessment + Planning

6. Plan for construction oversight

- Designate a team member, other than the contractor, who will be responsible for verifying the site is built per the construction specifications and drawings.
- Meet with the contractor (see *Construction P7.1: Communicate and verify sustainable construction practices*) prior to construction to review construction specifications, submittal requirements, and drawings and to convey the project's principles and performance goals.
- Describe the agreed upon method whereby changes can be made in the field during construction.

7. Develop a strategy for preparing a site maintenance plan

- Include all team members in the development of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*).

RECOMMENDED STRATEGIES

- Form a diverse team of qualified professionals as early as possible; team members will coordinate with one another throughout the life of the project. For optimal interaction and communication, ensure the project team has multiple face-to-face meetings.
- Discuss available resources (e.g., budget, staff, volunteers, equipment, materials) as part of the site maintenance plan. Determine short- and long-term maintenance principles and performance goals. Identify present and potential invasive species, and integrate a pest management plan into the performance goals.
- From the project onset, engage the client in participating in and ideally leading a design charrette process with the assistance of the project design team leadership. The design team should embrace a systems thinking design approach.

P2.1



Prerequisite 2.2: Conduct a pre-design site assessment

Required

P2.2



INTENT

Maximize the opportunities for beneficial site performance by conducting an accurate and detailed assessment of site conditions and exploring options for sustainable outcomes prior to design.

REQUIREMENTS

With the integrated design team (see *Pre-Design P2.1: Use an integrative design process*), collect and assess information about the site to help identify opportunities to protect and improve ecosystem services and use sustainable strategies to guide the design, construction, operation, and maintenance of the site:

- Map and assess existing site conditions and resources according to the outline in the Submittal documentation section.
 - Not all topics in the outline apply to every site, and each site may contain additional important unique elements that are not explicitly addressed here. Include additional topics not listed, if any, and provide reasons for not addressing certain topics.
- Collect additional information on the site and surrounding areas to assess opportunities for sustainable site outcomes, including all non-physical influences that may affect the site design, and potential effects of the design.
- Explain how the identified site conditions and resources will influence the sustainable design of the site.

Note: For potential Rating System implications regarding the following site assessment topics, see the associated prerequisites and credits listed in the right-hand column of the outline.

Section 2: Pre-Design Assessment + Planning

Topic	Description	Prerequisite or Credit #
1. Site Context—community and connectivity (mapped information)	Existing or planned pedestrian, bicycle, or transit including: <ul style="list-style-type: none"> Nearby transit routes and stops Bicycle lanes and shared lane markings Bicycle racks/storage Bicycle network 	C1.7, C6.5, C6.9
2. A. Water (mapped information) (continued)	100-year floodplain, as determined by FEMA (or local equivalent for projects outside the United States)	P1.2
	Delineated aquatic ecosystem, including isolated wetlands	P1.3
	Wetland, shoreline, or riparian buffers	P1.3, C3.6
	Artificially modified streams, wetlands, or shorelines (e.g., buried, piped, drained, channelized, bulkheaded, armored) <ul style="list-style-type: none"> Determine existing conditions, dimensions, and historic extent. 	C3.6
	Overland water flow on site <ul style="list-style-type: none"> Determine topography, direction, and effects on the watershed, including natural rates of erosion. 	P3.1, C3.3, C3.6, P7.2
	Pollution sources <ul style="list-style-type: none"> Existing and potential Point and nonpoint sources Health hazards, both on-site and in adjacent areas 	C1.5, C3.3, P7.2
2. B. Water (narrative information)	Precipitation <ul style="list-style-type: none"> Average annual precipitation Average monthly precipitation 	P3.1, P3.2, C3.3, C3.4, C3.5
	Watershed conditions <ul style="list-style-type: none"> Common stormwater pollutants Specific pollutants of concern Local, regional, or state watershed plans Artificial modification of natural hydrology 	P1.2, P3.1, C3.3, C3.5, C3.6
	Water sources <ul style="list-style-type: none"> Potable and non-potable water sources for the site Opportunities to capture, treat, and reuse rainwater and graywater 	P3.2, C3.3, C3.4, C3.5
3. A. Soils (mapped information)	Farmland <ul style="list-style-type: none"> Soils defined by U.S. Natural Resources Conservation Service (or local equivalent for projects outside the United States) as prime farmland, unique farmland, farmland of statewide importance, or farmland of local importance. 	P1.1
	Healthy soils	P4.1, C4.4, P7.3
	Soils disturbed by previous development <ul style="list-style-type: none"> Degree of disturbance (disturbed or severely disturbed soils) 	C7.4

P2.2



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Topic	Description	Prerequisite or Credit #
3. B. Reference Conditions for Soils and Vegetation (narrative information)	<u>Reference soil</u> (test results or verified allowable ranges) <ul style="list-style-type: none"> Organic matter (required) Compaction (field test or undisturbed core sample only) OR <ul style="list-style-type: none"> Infiltration (field test only) Soil chemical characteristics OR <ul style="list-style-type: none"> Soil biological function 	P4.1, C6.7, P7.3, C7.4
	EPA level III ecoregion <ul style="list-style-type: none"> Major native plant community types of the ecoregion based on the U.S. EPA (or local equivalent for projects outside the United States), www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm 	C4.6, C4.7
	Terrestrial biome <ul style="list-style-type: none"> Use the World Wildlife Fund <i>Wildfinder</i>, www.worldwildlife.org/science/wildfinder/ 	C4.8
	On-site food production <ul style="list-style-type: none"> Follow local, state, and federal regulations to ensure existing and imported soils are healthy for food production and are safe for physical contact by general public. For previously developed sites, brownfield sites, or sites that have been subject to application of chlorinated pesticides and herbicides, the following actions may need to be conducted to ensure soil safety: <ul style="list-style-type: none"> - Certified environmental professional assessment - Soil contamination reports (follow local, state, and federal regulations) - Tests for lead, arsenic, other heavy metals or chemicals of potential concern that may be found in the site area either on site or from airborne pollutants (via certified environmental labs) - Potential plant requirements (e.g., exposure, irrigation) - Community involvement possibilities 	C6.7
4. A. Vegetation (mapped information)	Habitats for threatened or endangered species <ul style="list-style-type: none"> Existing and potential habitats for threatened or endangered plant and animal species Federal or state threatened or endangered lists International Union for Conservation of Nature “Red List of Threatened Species” 	P1.4, P2.3
	Total existing vegetated area	C4.4, C4.6, C4.7, C4.8

continued

P2.2



Section 2: Pre-Design Assessment + Planning

Topic	Description	Prerequisite or Credit #
4. A. Vegetation (mapped information, <i>continued</i>)	Invasive plants <ul style="list-style-type: none"> Listed by regional, state, or federal entities 	P4.2
	Native plants and native plant communities <ul style="list-style-type: none"> For trees, note diameter at breast height (DBH). 	C4.6, C4.7
	Appropriate plant species	P4.3, C4.4
	Special status plants <ul style="list-style-type: none"> For trees, note DBH. 	C4.5
	Risk of catastrophic wildfire <ul style="list-style-type: none"> On-site areas and adjacent landscapes at risk 	C4.11
4. B. Materials Inventory (mapped information)	Existing materials and site elements <ul style="list-style-type: none"> Note materials, structures, and paving that could be safely retained, salvaged or reused, or recycled. 	C5.2, C5.4, C7.5, C7.6
4. C. Materials, Plants, Soils, and Labor Procurement (narrative information)	Potential suppliers of salvaged or reused materials <ul style="list-style-type: none"> Local sites or suppliers that may have materials and appropriate vegetation 	C5.4
	Potential suppliers of recycled materials	C5.5
	Potential suppliers of regional and local materials <ul style="list-style-type: none"> Materials, plants, and soils that are extracted, manufactured, or grown within the region 	C5.6, C6.11
	Potential suppliers of sustainable extracted materials <ul style="list-style-type: none"> Materials that are responsibly extracted from the earth in ways that protect ecosystems, respect cultural and community values, and improve land use 	C5.7
	Potential suppliers of safer alternative materials <ul style="list-style-type: none"> Materials that have disclosed chemical inventories, chemical hazard assessments, or use safer chemical alternatives 	C5.8
	Potential sustainable materials manufacturers <ul style="list-style-type: none"> Materials manufacturers that actively implement better business practices to reduce negative impacts on human health and the environment 	C5.9
	Potential sustainable plant producers <ul style="list-style-type: none"> Plant nurseries that actively implement better business practices to reduce negative impacts to human health and the environment 	C5.10
	Potential local workforce and businesses	C6.11

P2.2



Section 2: Pre-Design Assessment + Planning

Topic	Description	Prerequisite or Credit #
5. Human Use of Site (mapped information)	Access to <u>basic services</u> <ul style="list-style-type: none"> Nearby shops, services, and facilities that have pedestrian access Walking distances from planned project entrance 	C1.6
	Historic buildings, structures, objects, and cultural landscapes <ul style="list-style-type: none"> Note whether these are listed in a historic register. Note significance to local culture and history. 	C6.1
	Unique or interesting site features <ul style="list-style-type: none"> View corridors Site landmarks Large shade trees Water features (natural or created) 	C6.2, C6.4, C6.5, C6.6
6. A. Climate and Energy (mapped information)	Microclimate considerations <ul style="list-style-type: none"> Positive sounds or excessive noises Wind direction Sun exposure (sun angles) and shading opportunities Any other unique microclimate factors that may affect site design decisions, building orientation, and plant selection 	C4.10, C4.11, C6.4, C6.5, C6.6
	Passive or active energy generation opportunities <ul style="list-style-type: none"> e.g., wind, solar, geothermal, low-impact hydro 	C8.6
6. B. Energy (narrative information)	Renewable energy source contract opportunities <ul style="list-style-type: none"> Green power contracts Carbon offsets 	C8.6
7. Additional Considerations (any site-specific conditions not included above)		

P2.2



RECOMMENDED STRATEGIES

- Consult with local experts and the community to evaluate existing site conditions and identify sustainable strategies prior to design.
- Evaluate the impact a design approach may have on sustainability during construction, operations, and maintenance (e.g., pruning requirements, deadheading to maintain formalized designs and uses of plants, water use requirements).

Prerequisite 2.3: Designate and communicate Vegetation and Soil Protection Zones

Required

P2.3



INTENT

Maximize the benefits of ecosystem services by designating and communicating to project team members a site development plan that protects healthy vegetation, soils, and sensitive environmental features.

REQUIREMENTS

- Identify, map, and protect critical and sensitive existing on-site features in Vegetation and Soil Protection Zones (VSPZs).
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of VSPZs.

Note: Not all sites will contain a VSPZ.

VSPZ Mapping Requirements

Refer to the table below for relevant prerequisites (required) that may have VSPZ implications:

Prerequisite #	Prerequisite Name	VSPZ Requirement
Context P1.1	Limit development on farmland Case 2: Sites with farmland soils	95 percent of all healthy soils designated as prime farmland, unique farmland, farmland of statewide importance, or farmland of local importance
Context P1.2	Protect floodplain functions Case 3: Greenfields within floodplain	90 percent of 100-year floodplain area
Context P1.3	Conserve aquatic ecosystems Case 2: Sites with naturally occurring aquatic ecosystems	Entire delineated buffer, according to aquatic ecosystem classification
Context P1.4	Conserve habitat for threatened or endangered species Case 1: Brownfields/previously developed sites Case 2: Greenfield sites	Full extent of identified habitat
Soil+Veg P4.1	Create and communicate a soil management plan	Healthy soils that will be retained in place—show VSPZs on SMP map

Section 2: Pre-Design Assessment + Planning

Refer to the table below for relevant optional credits that may have VSPZ implications. Only include those credits that the project intends to pursue:

Credit #	Credit Name	VSPZ Requirement
Soil+Veg C4.4	Conserve healthy soils and appropriate vegetation	Minimum of 50 percent of total site area containing healthy soils and appropriate vegetation
Soil+Veg C4.5	Conserve special status vegetation	One foot (0.30 meter) radius for each inch DBH for special status trees; for shrubs, perennials, see below
Soil+Veg C4.6	Conserve and use native plants	Percentage of existing native plants on site
Soil+Veg C4.7	Conserve and restore native plant communities	Percentage of existing native plant communities ≥ 2,000 square feet (185.81 square meters)

- VSPZs can encompass one plant or can include several plants in a group.
- VSPZ boundaries for trees should extend out from the trunk, to a minimum distance of a one foot (0.30 meter) radius (measured at ground level) per inch (2.54 centimeters) of diameter at breast height (DBH) or the full lateral extent of the actual root system as determined by ground-penetrating radar or by using the Clark-Matheny method (see the Resources section).
- VSPZ boundaries for shrubs should extend out from the stem to twice the radius of the shrub.
- VSPZ boundaries for herbaceous vegetation should extend to encompass the diameter of the plant.

VSPZ Requirements:

- Soils and vegetation within VSPZs must not be disturbed or compacted during construction.
- Management activities within VSPZs must not reduce the function and resiliency of wetlands or aquatic ecosystems.
- Invasive species present within VSPZs must be treated using equipment that can be carried in and out of the zone on foot or will not otherwise detrimentally affect soil compaction.
- Only minimal impact site development is allowed within VSPZs. No more than 10 percent of the total area of all VSPZs can contain minimal impact site development.
- Construction impacts from overall site development must not decrease the capacity of VSPZs to support the desired vegetation. For example, construction activities outside of a VSPZ should not change drainage patterns and microclimate effects within the VSPZ.
- Protect VSPZs from equipment parking and traffic, storage of materials, and other construction activities with a fence or other physical barrier that cannot be easily moved. (Use a wildlife-permeable barrier as appropriate).
- Communicate the locations and protective measures of VSPZs to construction and maintenance personnel. Outline consequences to contractors if they do not respect VSPZ boundaries.

P2.3



Section 2: Pre-Design Assessment + Planning

RECOMMENDED STRATEGIES

- The number of roadways crossing through VSPZs should be minimized and constructed only when necessary, such as when a significant portion of the site can be reached only by crossing a VSPZ.
- Structures that must cross a VSPZ should be designed to minimize their impact on terrestrial and aquatic habitat connectivity.
- Additional planting within VSPZs must be done with care, because tree roots typically are located at the surface (sometimes to a depth of 2 to 3 inches, or 5.08 to 7.62 centimeters, at most).
- Perennial plantings within VSPZs should be done manually and without power equipment.
- Annual plantings are strongly discouraged within VSPZs.
- Additional planting within the one foot (0.30 meter) radius per inch (2.54 centimeters) DBH should be avoided. Planting here runs a high risk of damaging tree roots and soil chemistry and creating negative impacts due to excessive irrigation.
 - Planting should be limited to 25 percent of the area under the tree canopy or the area within a one-foot (0.30 meter) radius per inch (2.54 centimeters) DBH and must be done in consultation with a certified arborist or other appropriately qualified professional.
- Protect the root zone of trees found on site.
 - Try to protect groups rather than individual trees.
 - Design utility access away from the soil and roots of trees.
 - Reduce the need for utility trench work through strategic placement of utilities.
 - Where utility trench work is necessary, use air excavation to expose tree roots without damaging them (according to ANSI A300 Part 5).
 - If applicable, consider using directional boring technology (e.g., “mole,” “Ditch-Witch”).
 - For trees, ground-penetrating radar (GPR) or air excavation can be used to determine the location of tree roots.
- Consult with local experts qualified in plant health and safety to determine recommended special protection measures.
- Minimal impact site development should not require power equipment or wheeled vehicles and should not go beyond the necessary footprint of construction activity. Low impact construction is critical and essential to maintaining the integrity of VSPZs (e.g., construction attributes such as concrete slab foundations are strongly discouraged, permeable surfaces rather than impervious are strongly encouraged).

P2.3



Credit 2.4: Engage users and stakeholders

3 points

C2.4



INTENT

Identify specific, measurable, attainable, realistic, and timely project goals by engaging site users and stakeholders during the design process to supplement professional expertise with local knowledge.

REQUIREMENTS

Engage potential site users and stakeholders during the following design phases:

1. Site assessment process and program plan

- Engage site users and stakeholders in identifying specific, measurable, attainable, realistic, and timely project goals.
- Identify the programmatic and functional needs of the various site user groups.
- Ensure the section of the site assessment (see *P2.2: Conduct a pre-design site assessment*) is complete and describes the process of engaging site users and stakeholders (see *Pre-design P2.1: Use an integrative design process*). Incorporate the knowledge gained about the site and local area to into the program plan.
- Provide the site users and stakeholders with multiple schematic design alternatives and associated outcomes using visual representations.

2. Design development presentation and review

- Invite the site users and stakeholders to the design development presentation and review.

3. Present the design to the public

- Present the design to the public in at least two forms (e.g., website, community meeting, newspaper article, civic display).

RECOMMENDED STRATEGIES

- Solicit input and feedback in imaginative and flexible ways, such as through websites; surveys; visual preference questionnaires; charrettes; focus groups; field visits and tours; workshops; geographic information system (GIS) modeling and mapping; and facilitated, interactive exercises.
- Consider using a variety of approaches to garner more widespread public participation and to present designs (e.g., web-based or town hall-style presentations).
- Engage a wide variety of community members by providing food, childcare, transportation, mediators, interpreters, and written translations during public meetings, and take special effort to include less influential groups or individuals. Conduct meetings at community development centers and other convenient local gathering places.



SECTION 3

SITE DESIGN – WATER

PREREQUISITE / CREDIT	TITLE	POINTS
Water P3.1	Manage precipitation on site	Required
Water P3.2	Reduce water use for landscape irrigation	Required
Water C3.3	Manage precipitation beyond baseline	4-6 points
Water C3.4	Reduce outdoor water use	4-6 points
Water C3.5	Design functional stormwater features as amenities	4-5 points
Water C3.6	Restore aquatic ecosystems	4-6 points

Prerequisite 3.1: Manage precipitation on site

Required

INTENT

Reduce negative impacts to aquatic ecosystems, channel morphology, and dry weather base flow by replicating natural hydrologic conditions and retaining precipitation on site.

REQUIREMENTS

- Retain the precipitation volume from the 60th percentile precipitation event as defined by the U.S. EPA in the *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (or local equivalent for projects outside the United States).
- Retain precipitation volume through on-site infiltration, evapotranspiration, and reuse.
 - Implement runoff-reduction strategies (e.g., biofiltration through plants, soil) that also improve water quality.
 - Cisterns, if used, must be implemented in combination with other approaches to meet the requirements of this prerequisite.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes the maintenance activities used to ensure long-term effectiveness of stormwater features.

Note: On sites where the retention of the precipitation volume from the 60th percentile precipitation event is not feasible due to site constraints (such as clay soils, high groundwater elevations, geotechnical issues, below-ground contamination, underground utilities or transportation systems, watershed water balance considerations, low evapotranspiration rates, or lack of water use potential), retain the maximum precipitation volume possible on the site up to the 60th percentile precipitation event.

RECOMMENDED STRATEGIES

- Ensure that discharge volumes and rates do not increase the natural rate of erosion in receiving water channels or negatively affect a receiving channel's ecological flows or natural groundwater replenishment rates and volumes.
- Implement strategies to reduce precipitation runoff volumes, peak flows, and pollutant discharges.
- Implement strategies to increase evapotranspiration, filtration and infiltration, and mitigate elevated water temperatures caused by contact with impervious surfaces. Use the following strategies and design approaches:
 - Design to minimize impervious surfaces; specify permeable materials for hard surfaces, including permeable concrete, asphalt, and pavers.
 - Design hard surfaces to drain into localized, on-site landscape areas, and design landscape areas to accept precipitation runoff from hard surfaces.
 - Provide infiltration opportunities in the landscape that use plants and healthy soils as filters, such as bioswales, raingardens, water quality ponds, constructed wetlands, or vegetated buffers, that filter, infiltrate, evapotranspire, and retain precipitation, recharge groundwater, and reduce pollutant loadings, runoff volumes, and rates.
 - Where runoff conveyance systems are needed, use vegetated channels when possible. Where vegetated channels are not practical, the use of hard non-erosive

P3.1



Section 3: Site Design—Water

- materials to convey surface water should take precedence over using pipes, culverts, or underground channels.
- Create living landscapes using soil and vegetation features, such as vegetated roofs, walls, or facades; raingardens; or tree canopies.
 - Select appropriate vegetation features that can tolerate periodic inundation and soil saturation without harming the growth or vigor of the plant.
 - When selecting vegetation for managing precipitation runoff, select plants that are resistant or less susceptible to pollutants commonly found in precipitation runoff.
 - Where possible, select plants appropriate for the site and climate based on their capacity to reduce pollutant loadings for specific pollutants of concern in the receiving watershed.
- Improve the water-retention capacity of the soil by increasing the organic matter content of the soil through the addition of compost or other organic soil amendments.
 - Use rainwater-harvesting systems to reduce precipitation runoff volumes and rates. Design rainwater harvesting and use systems to maintain the ecological flows of receiving waters and historical groundwater recharge rates.
 - Avoid or minimize the use of materials used in buildings, hardscape, and landscape construction that can be a source of pollutants in stormwater, such as:
 - Copper and zinc roofs, roof gutters, downspouts, and siding
 - Galvanized materials (e.g. fences, fence posts, guardrails, signposts)
 - Treated lumber
 - Use integrated pest management (IPM) practices to control pests
 - Minimize the use of fertilizers on site and implement practices to reduce nutrient runoff (e.g., slow-release fertilizers, optimized application timing for plant uptake).
 - Plan for and implement maintenance activities designed to reduce the exposure of pollutants to stormwater, such as:
 - Minimizing exposure of stored materials to precipitation to minimize the chance of pollutants running off the site or entering groundwater both on and off site
 - Developing and implementing a contaminated/chemical spill response plan
 - Minimizing the use of salt or other potentially harmful de-icing chemicals
 - Avoiding on-site maintenance of construction equipment to reduce pollutant loadings of oils, grease, or hydraulic fluids
 - Avoiding on-site fueling of vehicles to the maximum extent practicable
 - Where appropriate, implement systems of practices in a treatment train to provide multiple pollutant removal processes (e.g., runoff reduction through evapotranspiration and infiltration, sedimentation, filtration, adsorption, biological degradation or uptake) to reduce the concentrations of pollutants in precipitation runoff and to provide redundancy in the system.
 - Use soil and vegetation-based controls based on their capacity to reduce precipitation runoff and pollutant loadings through evapotranspiration and phytoremediation.
 - Maintain infiltration rates, and regenerate the adsorption capacity of the soils.

P3.1



Prerequisite 3.2: Reduce water use for landscape irrigation

Required

INTENT

Conserve water resources and minimize energy use by reducing the use of potable water, natural surface water, and groundwater withdrawals for landscape irrigation after the establishment period.

REQUIREMENTS*

This prerequisite applies only to long-term water use for the final vegetated area beyond the establishment period.

- Reduce or eliminate the use of potable water, natural surface water, (e.g., lakes, streams) and groundwater withdrawals for landscape irrigation (beyond the establishment period).
- Use the U.S. EPA WaterSense Water Budget Tool (or local equivalent for projects outside the United States) to identify the baseline case and water savings (www.epa.gov/watersense/water_budget/application.html).
 - Reduce water usage by at least 50 percent from the baseline case beyond the establishment period.
 - > If the water source does not come from a potable water source, local health standards must be met.
 - > Install water meters to record and measure water usage to compare to the established baseline.

OR

- Design the landscape to not require a permanent irrigation system.
- Ensure the sections of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) are complete and describe the anticipated watering schedule as well as the process for maintaining non-potable irrigation water sources.

Exemptions:

- Water volume used for the following purposes may be included or excluded from irrigation calculations at the project team's discretion:
 - Water used during establishment period
 - Water used to irrigate non-commercial food production gardens. Irrigation used on edible plants should not harm human health. (See *HHWB C6.7: Provide for on-site food production*.)
 - Water used as required by local regulations in fire-prone areas for fire suppression systems
 - Water used for athletic fields (if vegetated)

P3.2



* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v4 *WE Prerequisite 1: Outdoor water use reduction*

Section 3: Site Design—Water

RECOMMENDED STRATEGIES

Reduce potable water use with any combination of the following items and methods:

- Design the site to maximize the use of captured stormwater for landscape elements
- Design the plantings, soils, and other features to be self-sustaining with natural precipitation only. Limit water use to time of planting only.
- Plant at the optimal season for your region to reduce or eliminate the need for watering for establishment.
- If turfgrasses are to be used, they should be regionally appropriate and minimize post-establishment requirements for irrigation.
- Improve water-retention capacity of soil by increasing organic matter (e.g., adding compost)
- Design irrigation systems in such a way that trees, shrubs, and ground cover are irrigated in separate hydrozones. This way, watering can be discontinued by zone as plants become established.
- Use high-efficiency equipment (e.g., drip irrigation) and climate-based controllers for irrigation systems
- Reuse graywater, captured rainwater, HVAC blowdown, or condensate water for irrigation to decrease potable water use for irrigation and to create a net benefit to the local watershed by making the landscape part of the natural water-treatment process.
- If graywater or wastewater is to be recycled for landscape irrigation, consider conducting chemical tests to determine suitability for reuse on intended vegetation.
- Use water treated and conveyed by a public agency specifically for non-potable uses

P3.2



Credit 3.3: Manage precipitation beyond baseline

4–6 points

INTENT

Maintain site water balance, protect water quality, and reduce negative impacts to aquatic ecosystems, channel morphology, and dry weather base flow by replicating natural hydrologic conditions and providing retention and treatment for precipitation on site.

REQUIREMENTS*

Through on-site infiltration, evapotranspiration, and harvest use, retain or treat the maximum precipitation volume possible beyond the required baseline precipitation volume of the 60th percentile precipitation event described in *Water P3.1: Manage precipitation on site*.

These requirements pertain to the entire area within the SITES project boundary.

- Retain or treat precipitation volume for the following percentile precipitation events:
 - 80th percentile precipitation event **4 points**
 - 90th percentile precipitation event **5 points**
 - 95th percentile precipitation event **6 points**
- Retain or treat the maximum precipitation volume on site for the percentile precipitation event associated with the desired point total above, as defined by the U.S. EPA in the *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act* (or local equivalent for projects outside the United States). Use daily rainfall data and the methodology in the EPA document to determine the target percentile volume.
- For treatment of any precipitation volume not retained from the selected percentile precipitation event, listed above:
 - Treat any volume of runoff using an appropriate technology.
 - Ensure the entirety of the selected percentile precipitation event not retained is treated, and that remaining runoff will be discharged at rates consistent with the natural rate of erosion in the receiving water channel (i.e., discharge rate limit).
 - BMPs must be scaled to account for the additional volume of runoff entering the BMP from areas off site.
 - > The treatment practices implemented must achieve, at a minimum, an average discharge concentration of less than or equal to 25 milligrams per liter total suspended solids for the volume treated.
 - > In cases where receiving waters are impaired or threatened by specific pollutants of concern, treatment must be provided for these pollutants.
- Ensure the sections of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) are complete and detail the proper maintenance activities used to ensure long-term effectiveness of stormwater features, including water quality treatment activities.

RECOMMENDED STRATEGIES

See Recommended strategies in *Water P3.1: Manage precipitation on site*.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v4 SS Credit 4: *Rainwater Management*

C3.3



Credit 3.4: Reduce outdoor water use

4–6 points

INTENT

Conserve water resources and minimize energy use by encouraging alternative irrigation methods and water conservation strategies that limit or eliminate the use of potable water, natural surface water, and groundwater withdrawals for landscape irrigation and other outdoor use.

REQUIREMENTS*

This credit applies to short- and long-term water use.

Reduce or eliminate the use of potable water, natural surface water (e.g., lakes, rivers streams), and groundwater withdrawals for outdoor use, including landscape irrigation and created water features. Ensure that water use will not negatively affect receiving waters.

Exemptions: Water volume used for the following purposes may be included or excluded from calculations at the project team's discretion:

- Water used during establishment period (excluding Option 3)
- Water used to irrigate non-commercial food production gardens. Irrigation used on edible plants should not harm human health. (See *HHWB C6.7: Provide for on-site food production.*)
- Water used as required by local regulations in fire-prone areas for fire-suppression systems

Option 1: Reduce outdoor water use

4 points

For landscape irrigation:

- Reduce water use by at least 75 percent from a baseline case beyond the establishment period. Refer to the U.S. EPA WaterSense Water Budget Tool (or local equivalent for projects outside the United States) used in *Water P3.2: Reduce water use for landscape irrigation* (www.epa.gov/watersense/water_budget/application.html).
- Install water meters to record and measure water usage to compare to the established baseline.

For created water features:

- Verify that 50 percent of annual make-up water for site water features comes from non-potable water sources OR that site water features only require a total of 10,000 gallons (37,854.12 liters) or less of potable water annually. Note that initial filling may be derived from potable water if less than 37,500 gallons (141,952.94 liters).
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. Regarding the water features, the plan must describe appropriate maintenance activities that do not use chemicals likely to harm aquatic life, such as chlorine and bromine (except where required by local health code), and that ensure habitat for mosquitoes will not be created.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v4 *WE Credit 1: Outdoor water use reduction*

C3.4



Section 3: Site Design—Water

Option 2: Significantly reduce outdoor water use

5 points

For landscape irrigation:

- Use no potable water or other natural surface or groundwater withdrawal resources for landscape irrigation beyond the establishment period. Refer to the U.S. EPA WaterSense Water Budget Tool (or local equivalent for projects outside the United States) used in *Water P3.2: Reduce water use for landscape irrigation* (www.epa.gov/watersense/water_budget/application.html).
- Install water meters to record and measure water usage to compare to the established baseline.
- Use temporary irrigation systems that rely on potable water during the establishment period only if such systems will be removed or disconnected at the end of the period.
- Use the following water for landscape irrigation only after the establishment period:
 - Captured rainwater
 - Reclaimed water
 - Recycled wastewater
 - Recycled graywater
 - Air-conditioner condensate
 - Blowdown water from boilers and cooling towers
 - Water treated and conveyed by a public agency specifically for non-potable uses

For created water features:

- Site water features must total 5,000 gallons (18,927 liters) or less of potable water annually.
OR
- 75 percent of annual make-up water for water features must come from non-potable water sources.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. Regarding the water features, the plan must describe appropriate maintenance activities that do not use chemicals likely to harm aquatic life, such as chlorine and bromine (except where required by local health code), and that ensure habitat for mosquitoes will not be created.

Option 3: Eliminate outdoor water use

6 points

For landscape irrigation:

- Eliminate long-term irrigation
- Use the following water for landscape irrigation only during the establishment period:
 - Captured rainwater
 - Reclaimed water
 - Recycled wastewater
 - Recycled graywater
 - Air-conditioner condensate
 - Blowdown water from boilers and cooling towers
 - Water treated and conveyed by a public agency specifically for non-potable uses

For created water features:

- 100 percent of annual make-up water for water features must come from non-potable water sources.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. Regarding the water features, the plan must describe appropriate maintenance activities that do not use chemicals likely to harm aquatic life, such as chlorine and bromine (except where required by local health code), and that ensure habitat for mosquitoes will not be created.

RECOMMENDED STRATEGIES

See strategies listed in *Water P3.2: Reduce water use for landscape irrigation*.

C3.4



Credit 3.5: Design functional stormwater features as amenities

4–5 points

INTENT

Provide a connection to the local climate and hydrology by integrating aesthetically pleasing stormwater features that are visually and physically accessible and manage on-site stormwater.

REQUIREMENTS

The requirements apply to stormwater features that use precipitation as their sole source of water and that function as stormwater management elements (e.g., bioswales, raingardens, vegetated roofs). These features must be designed to be visually and physically accessible to site users from proposed high-use portions of the site.

- Ensure site precipitation is treated as an amenity in the way it is received, conveyed, and managed on site for at least:
 - 50 percent of stormwater features **4 points**
 - 100 percent of stormwater features **5 points**
 - > Percentages are based on total square footage (square meters) of the stormwater features, including conveyance features.
 - > Cisterns and vaults that are used for retention purposes and considered amenities should be included in the percentage calculations. However, exclude those used only for rainwater collection and reuse.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. The plan must describe appropriate maintenance activities that do not use chemicals likely to harm aquatic life, such as chlorine and bromine (except where required by local health code), and that ensure habitat for mosquitoes will not be created.

RECOMMENDED STRATEGIES

- Design and maintain water features as natural ecosystems with water sources, native plants and native plant communities, and other aquatic organisms appropriate for local conditions.
- Natural swimming pools or other water features intended for human contact may require additional treatment such as ozonation or thermal treatment.
- Employ artists and craftspeople to collaborate with the design team to create rainwater systems that combine function and aesthetic appeal.
- Employ low impact development strategies that emphasize site design and planning techniques to mimic the natural infiltration-based, groundwater-driven hydrology of historic landscapes.

C3.5



Credit 3.6: Restore aquatic ecosystems

4–6 points

INTENT

Support healthy functioning of aquatic ecosystems for fish, other wildlife, and people by restoring the ecological function, integrity, and resiliency of those ecosystems that have been degraded, damaged, or destroyed.

REQUIREMENTS

The requirements apply to sites that contain only the following naturally occurring aquatic ecosystems that have been degraded, damaged, or destroyed:

- Marine/Estuarine—Tidal wetlands, mudflats, shorelines, reefs, seagrass beds
- Riverine—Streams, rivers (associated floodplains and their riparian buffer)
- Lacustrine—Lakes, ponds (associated shorelines and their riparian buffer)
- Palustrine—Non-tidal wetlands, seeps, springs, vernal pools, seasonal wetlands

Degradation, damage, or destruction may be a result of artificial modification (e.g., burying, filling, draining, piping, channeling, bulkheading, armoring, levees, water control structures, illicit discharges); sea level rise; alteration of natural hydrology; loss of native flora and fauna; invasive species; and alteration of biological processes, soils, geomorphology, and water quality.

- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and shows the locations of any existing aquatic ecosystems on site that have been degraded, damaged, or destroyed.
- Restore the geographic extent of the aquatic ecosystem within the SITES project boundary for a minimum of:
 - 30 percent of the geographic extent **4 points**
 - 60 percent of the geographic extent **5 points**
 - 90 percent of the geographic extent **6 points**
- Develop a restoration plan based on the nine *Attributes of Restored Ecosystems*.
 - Restoration plan must include a description of the reference site and its conditions, including its native plant communities, appropriate aquatic habitat, water quality improvements, and stable bank or shoreline conditions.
 - Restoration of river and stream channels must also be inclusive of their respective floodplain and riparian zone. Restoration of lakes and ponds must also be inclusive of their respective shorelines.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes ongoing management activities to protect the integrity of the aquatic ecosystems.

Attributes of Restored Ecosystems (From the Society for Ecological Restoration's *International Primer on Ecological Restoration*)

1. The restored ecosystem contains a characteristic assemblage of the species that occur in the reference ecosystem and that provide appropriate community structure.
2. The restored ecosystem consists of indigenous species to the greatest practicable extent.
3. All functional groups necessary for the continued development and/or stability of the restored ecosystem are represented or, if they are not, the missing groups have the potential to colonize by natural means.

C3.6



Section 3: Site Design—Water

4. The physical environment of the restored ecosystem is capable of sustaining reproducing populations of the species necessary for its continued stability or development along the desired trajectory.
5. The restored ecosystem apparently functions normally for its ecological stage of development, and signs of dysfunction are absent.
6. The restored ecosystem is suitably integrated into a larger ecological matrix or landscape, with which it interacts through abiotic and biotic flows and exchanges.
7. Potential threats to the health and integrity of the restored ecosystem from the surrounding landscape have been eliminated or reduced as much as possible.
8. The restored ecosystem is sufficiently resilient to endure the normal periodic stress events in the local environment that serve to maintain the integrity of the ecosystem.
9. The restored ecosystem is self-sustaining to the same degree as its reference system and has the potential to persist indefinitely under existing environmental conditions.

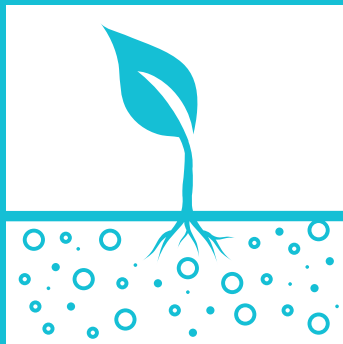
Note: Projects restoring aquatic ecosystems as compensatory mitigation to meet regulatory requirements may not be eligible for this credit. This credit does not apply to stormwater management practices. This credit also does not apply to the creation of a new aquatic ecosystem when none existed prior to current project development, except when it can be justified to shift the geographic extent of the aquatic ecosystem to compensate for projected sea level rise or changing hydrologic conditions.

RECOMMENDED STRATEGIES

- Restoration prescriptions and strategies will vary, but base them on historic reference conditions, natural processes, natural materials, and the reestablishment of native vegetation communities.
- Develop a set of restoration and management practices that permanently will remove from the site stressors that are causing degradation or damage.
- Reconstruct and reintroduce to the site the array of biotic, geochemical, hydrological, morphological, and vegetative processes that will result in the aquatic ecosystems being placed on a trajectory toward partial or full recovery.
- Specific restoration methodologies and techniques should be in accordance with the current science and practice of restoration as applicable for the specific aquatic ecosystem being restored and within the context of its location.

C3.6





SECTION 4

SITE DESIGN – SOIL + VEGETATION

PREREQUISITE / CREDIT	TITLE	POINTS
Soil+Veg P4.1	Create and communicate a soil management plan	Required
Soil+Veg P4.2	Control and manage invasive plants	Required
Soil+Veg P4.3	Use appropriate plants	Required
Soil+Veg C4.4	Conserve healthy soils and appropriate vegetation	4-6 points
Soil+Veg C4.5	Conserve special status vegetation	4 points
Soil+Veg C4.6	Conserve and use native plants	3-6 points
Soil+Veg C4.7	Conserve and restore native plant communities	4-6 points
Soil+Veg C4.8	Optimize biomass	1-6 points
Soil+Veg C4.9	Reduce urban heat island effects	4 points
Soil+Veg C4.10	Use vegetation to minimize building energy use	1-4 points
Soil+Veg C4.11	Reduce the risk of catastrophic wildfire	4 points

Prerequisite 4.1: Create and communicate a soil management plan

Required

INTENT

Support healthy plants, biological communities, and water storage and infiltration by planning for soil restoration in the design stage and limiting soil disturbance during construction.

REQUIREMENTS

- Create a soil management plan (SMP) prior to construction that provides the following information in a site plan and a worksheet (see *Soil Management Plan Worksheet*):
 - Indicate locations of existing healthy soils on site and any Vegetation and Soil Protection Zones (VSPZs) (See *Pre-Design P2.3: Designate and communicate VSPZs*) and steps taken to protect these from any disturbance during construction.
 - Specify how construction activities are designed to minimize soil disturbance.
 - Identify disturbed soils that will be re-vegetated (soil restoration treatment zones):
 - > For soils disturbed during current construction activity (as required in *Construction P7.3: Restore soils disturbed during construction*)
 - > For soils disturbed by previous development (if pursuing *Construction C7.4: Restore soils disturbed by previous development*)
 - Identify severely disturbed soils that will be re-vegetated.
 - Describe in detail the planned treatment for each soil restoration treatment zone, including, if applicable, how reference soil characteristics (as identified in *Pre-Design P2.2: Conduct a pre-design site assessment*) will be met for each zone.
- Communicate the SMP to site contractors through site drawings and written specifications.

Note: Imported topsoils, or manufactured soil blends designed to serve as topsoil, may not be mined from the following locations (unless these soils are a byproduct of a construction process):

- Greenfield sites
- Prime farmland, unique farmland, farmland of statewide importance, or farmland of local importance as defined by the U.S. Natural Resources Conservation Service (or local equivalent for projects outside the United States)

Areas with disturbed soils (as a result of current construction activities) must be restored to a minimum 12-inch (30.48-centimeter) depth per the requirements of *Construction P7.3: Restore soils disturbed during construction*.

P4.1



Section 4: Site Design—Soil + Vegetation

RECOMMENDED STRATEGIES

- Before construction begins, the SMP prescribes soil restoration treatments that will be used to restore all soil areas that will be disturbed during construction and re-vegetated at the end of the project, as required by *Construction P7.3: Restore soils disturbed during construction*.
- Consider existing soil conditions during site design, identify VSPZs and soil restoration treatments for soils that will be disturbed, and communicate clearly with all site contractors to ensure that soil protection and restoration goals are understood and achieved.
- Install fencing or provide other effective physical barriers to protect VSPZs before construction commences (as required by *Pre-Design P2.3: Designate and communicate VSPZs*).
- Integrate the SMP with site erosion and sediment control planning (e.g., stormwater pollution prevention plan (SWPPP) or erosion and sedimentation control (ESC) plan; see *Construction P7.2: Control and retain construction pollutants*). For instance, use compost blankets, berms, or socks for erosion and sediment control, and, at the end of the project, reuse the same compost as a soil restoration amendment.
- Limit disturbance during construction to minimize the need for additional restoration. In areas that will be re-vegetated, restore soil characteristics necessary to support the selected vegetation types. Example methods of restoring soils include the following:
 - Stockpiling and reusing existing site topsoils, incorporating organic amendments if needed
 - Amending site soils with organic matter in place and mechanically correcting compaction, if needed (e.g., by ripping or discing)
 - Importing a topsoil or soil blend designed to serve as topsoil
- When selecting a soil restoration strategy, consider the design, site use, and future site maintenance expectation. Potential strategies are:
 - Adding mature, stable compost to unscreened soil
 - Many un-screened and un-amended soils will drain adequately
 - Amending with other earth materials to modify a soil's gradation/texture and organic matter content
- Best management practices include using soils for functions comparable to their original function (e.g., topsoil is used as topsoil, subsoil as subsoil). In some cases, subsoil can be reused and amended to become functional topsoil.

P4.1



Prerequisite 4.2: Control and manage invasive plants

Required

INTENT

Limit damage to local ecosystem services by developing and implementing an active management plan for the control and subsequent management of known invasive plants found on site, and by ensuring that no invasive species are brought to the site.

REQUIREMENTS

- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and evaluates and documents whether invasive species are present on the project site.
- During the project, use only plant species that are not currently listed as invasive on any federal or qualifying regional lists (or local equivalent for projects outside the United States), as described below
 - State or local lists (when listing occurs through a vetted, transparent process and has been accepted by regional stakeholders)
 - The USDA Natural Resources Conservation Service PLANTS Database
 - Invasive Plant Atlas of the United States website
 - State Noxious Weed laws
 - Federal Noxious Weed laws
- Begin removal of invasive species before or during the construction phase of the project. Note that invasive species present within any Vegetation and Soil Protection Zones (VSPZs) on site must be treated using equipment that can either be carried in and out of the zone on foot or will not detrimentally affect soil compaction.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes a plan for active, multi-year invasive species control and management of any plant species currently listed as invasive on the above lists
 - The following components for invasive species management must be included in the site maintenance plan:
 - > Integrated pest management (IPM) or plant health care (PHC) strategies
 - > A procedure for identifying and monitoring for additional invasive species that may colonize the site and new species as they are recognized by local authorities
 - > Initial treatment, follow-up treatments, long-term control including monitoring, and methods of invasive plant material disposal to prevent spread

P4.2



Section 4: Site Design—Soil + Vegetation

RECOMMENDED STRATEGIES

- Contact local and state governmental agencies, consultants, and educational facilities to learn the most appropriate and effective management techniques for invasive species identified on site.
- When removing invasive plants within VSPZs prior to construction, communicate strategies that limit levels of disruptive activity within these protected areas to every extent possible.
- The U.S. National Invasive Species Council's 2008-2012 National Invasive Species Management Plan recommends the following strategies to achieve long-term objectives:
 - Prevention is the first-line of defense. Prevention calls for preventing the introduction and establishment of invasive species to reduce their impact on the environment, the economy and health of the United States.
 - Early Detection, rapid assessment and Rapid Response (EDRR) may act as a critical second defense. EDRR calls for developing and enhancing the capacity to identify, report, and effectively respond to newly discovered and localized invasive species.
 - Through control and management, the spread of widely established invasive species can be slowed and their impacts reduced. Control and management calls for containing and reducing the spread of invasive populations to minimize their harmful impacts.
 - Invasive species can severely undermine the ability of plants and animal communities to recover. Restoration calls for the restoration of high-value ecosystems to meet natural resource conservation goals by conducting restoration efforts on multiple scales.
 - Invasive species cross project boundaries, making coordination and collaboration critical to success. Organizational collaboration calls for maximizing collaboration on invasive species issues among federal, state, local and tribal governments, private organizations, developers of neighboring sites, and individuals.

P4.2



Prerequisite 4.3: Use appropriate plants

Required

INTENT

Improve landscape performance and reduce resource use by installing only plants that are appropriate for site conditions, climate, and design intent.

REQUIREMENTS

- Use only appropriate plant species that are suitable for site conditions, climate, and design intent. Both native plants and non-natives may qualify.
- Use plants that are nursery-grown, legally harvested, or salvaged for reuse from on or off site. All nursery-grown plants must use an applicable regional standard or regionally adopted guidelines. If no regional standards or guidelines exist, nursery-grown plants must use the ANSI Z60.1-2004 American Standard for Nursery Stock.

RECOMMENDED STRATEGIES

- Select plants that will thrive in the climate and conditions of the site. Avoid invasive species that may jeopardize local ecosystems.
- Refer to municipal lists of recommended appropriate and native plant species. Cross-check with state and federal noxious weed and invasive plants lists (see *Soil+Veg P4.2: Control and manage invasive plants*).
- If turf grasses are to be used, select them to be regionally appropriate and minimize post-establishment requirements for irrigation, pesticide, fertilizer, and maintenance.
- Contact local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of plants appropriate for the site.
- For tree plantings, use the ANSI A300 Best Management Practices for Tree Planting as a guide.
- Plant diversity provides resistance to insect and disease pests; as a general guide for larger sites, plant no more than 10 percent of any species, no more than 20 percent of any genus, and no more than 30 percent of any family. For smaller sites, select species that contribute to the plant diversity of the community and region as a whole.

P4.3



Credit 4.4: Conserve healthy soils and appropriate vegetation

4–6 points

INTENT

Maintain existing ecosystem services and landscape performance, reduce resource use, and protect soil health by limiting the disturbance of existing appropriate plants and healthy soils.

REQUIREMENTS

- Conserve existing healthy soils and plants that are appropriate for site conditions, climate, and design intent in Vegetation and Soil Protection Zones (VSPZs) to equal at least:
 - 50 percent of the site's existing vegetated area **4 points**
 - 75 percent of the site's existing vegetated area **5 points**
 - 95 percent of the site's existing vegetated area **6 points**
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and describes and locates the healthy soils and appropriate plant species found on site.

Note: Limited restoration activities, including invasive species removal, are allowed within VSPZs (see *Pre-Design P2.3: Designate and communicate Vegetation and Soil Protection Zones (VSPZs)*).

C4.4



Section 4: Site Design—Soil + Vegetation

RECOMMENDED STRATEGIES

- Locate construction activities, including storage of materials, vehicular access and parking, and placement of utilities, on areas of previously disturbed soils as identified in the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*).
- Limit grading to areas of previously disturbed soils.
- Establish clear construction boundaries to minimize disturbance to healthy soils and appropriate vegetation.
- Limit construction to a tight envelope around development, which will reduce the area of soil that needs to be restored in *Construction P7.3: Restore soils disturbed during construction*.
- Additional planting within the one foot (0.31 meter) radius per inch (2.54 centimeters) diameter at breast height (DBH) should be avoided. Planting here runs a high risk of damaging tree roots and soil chemistry and having other negative impacts due to excessive irrigation.
 - Planting should be limited to 25 percent of the area under the tree canopy or the area within a one foot (0.31 meter) radius per inch DBH and must be done in consultation with a certified arborist or other appropriately qualified professional.
- Protect the root zone of trees found on site:
 - Try to protect groups of trees rather than individual trees.
 - Design utility access away from the soil and roots of trees.
 - Reduce the need for utility trench work through strategic placement of utilities.
 - Where utility trench work is necessary, use air excavation to expose tree roots without damaging them (according to ANSI A300 Part 5).
 - If applicable, consider using directional boring technology (e.g., “mole,” “Ditch-Witch”).
 - For trees, ground-penetrating radar (GPR) or air excavation can be used to determine the location of tree roots.

C4.4



Credit 4.5: Conserve special status vegetation

4 points

INTENT

Protect existing ecosystem services by identifying and conserving all vegetation on site designated as special status by local, state, or federal entities.

REQUIREMENTS

This requirement applies only to plants designated as special status by local, state, or federal entities. These plants may include, but are not limited to, heritage or legacy trees, specimen trees (as designated by a local tree board), rare and endangered species, rare vegetation in a unique habitat, and unusual genetic variants of a particular species. Native plant communities and cultural landscapes are addressed in other credits.

- Establish Vegetation and Soil Protection Zones (VSPZs) to protect special status trees and other plants (see *Pre-Design P2.3: Designate and communicate VSPZs*).
- Ensure the section of the site assessment (See *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and documents locations of trees or other plants with special status designations.
- Ensure the section of the site maintenance plan (See *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the ongoing management activities to protect the integrity of the VSPZs, including a description of how the critical aspects of the special status plants' culture and habitat are being protected and maintained (e.g., hydrology, associated plant communities, exposure).

Note: VSPZs can encompass one plant or can include several plants in a group (see *Pre-Design P2.3: Designate and communicate VSPZs*).

RECOMMENDED STRATEGIES

- Design the site to minimize harm to special status trees and other plants.
- Consult with local experts qualified in plant health and safety to determine appropriate special protection measures.
- Additional planting within the one foot (0.31 meter) radius per inch (2.54 centimeter) DBH should be avoided. Planting here runs a high risk of damaging tree roots and soil chemistry and having other negative impacts due to excessive irrigation.
 - Planting should be limited to 25 percent of the area under the tree canopy or the area within one foot (0.31 meter) radius per inch (2.54 centimeter) DBH and must be done in consultation with a certified arborist or other appropriately qualified professional.
- Protect the root zone of trees found on site.
 - Try to protect groups of trees rather than individual trees.
 - Design utility access away from the soil and roots of trees.
 - Reduce the need for utility trench work through strategic placement of utilities.
 - Where utility trench work is necessary, use air excavation to expose tree roots without damaging them (according to ANSI A300 Part 5).
 - If applicable, consider using directional boring technology (e.g., “mole,” “Ditch-Witch”).
 - For trees, ground-penetrating radar (GPR) or air excavation can be used to determine the location of tree roots.

C4.5



Credit 4.6: Conserve and use native plants

3–6 points

INTENT

Foster habitat for native wildlife that is necessary for plant reproduction by conserving or installing plants that are native to the site's ecoregion.

REQUIREMENTS

- Conserve existing appropriate native plants and/or install new native plants that, according to the *SITES Native Plants Calculator*, equal a native plant score of at least:
 - 20 percent total native plant score **3 points**
 - 40 percent total native plant score **4 points**
 - 60 percent total native plant score **6 points**
- Conserve a percentage of the site's existing appropriate native plants in Vegetation and Soil Protection Zones (VSPZs) (see *Pre-Design P2.3: Designate and communicate VSPZs*).
 - The requirements apply to existing appropriate native plants as identified in the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*). This option is limited to conserving individual native plants in situ, not ones that are growing within a preserved native plant community (see *Soil+Veg C4.7: Conserve and restore native plant communities*).
 - Conservation calculations are measured by surface area of existing native plant area.
- Install new appropriate native plants to equal a percentage of the site's final vegetated area
 - New native plant calculations are measured by surface area of final vegetated area, using estimated vegetated cover within 10 years of installation.
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete, shows existing vegetated area, and distinguishes which plants are existing native species.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of the VSPZs.

RECOMMENDED STRATEGIES

- Native plants can be used to express multiple styles of design.
- On sites with existing native vegetation, design the site to preserve native plants, where possible.
- On previously developed sites, use local and regional governmental agencies, consultants, educational facilities, and native plant societies as resources for the selection of native plants appropriate for the site.
- Consult qualified professionals (e.g., an arborist, biologist, environmental scientist) to conduct a vegetation assessment and identify appropriate plant species for the site.

C4.6



Credit 4.7: Conserve and restore native plant communities

4–6 points

INTENT

Contribute to regional diversity of flora and provide habitat for native wildlife by conserving existing native plant communities and installing vegetation that contributes to plant communities native to the ecoregion.

REQUIREMENTS

- Conserve existing native plant communities and/or restore native plant communities that, according to the *SITES Native Plant Communities Calculator*, equal a native plant community score of at least:
 - 20 percent total native plant community score **4 points**
 - 40 percent total native plant community score **5 points**
 - 60 percent total native plant community score **6 points**
- Conserve a percentage of the site's existing native plant communities in Vegetation and Soil Protection Zones (VSPZs) (see *Pre-Design P2.3: Designate and communicate VSPZs*).
 - The requirements apply to existing native plant communities, as identified in the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*), in which evidence of human disturbance is minimal and exotic and invasive plants make up less than 10 percent of the total area of existing native plant communities.
 - Make conservation calculations by surface area. Each area conserved must be contiguous and a minimum of 2,000 square feet (185.81 square meters).
- Restore a percentage of the site's final vegetated area with native plant communities.
 - Make restoration calculations by surface area of vegetated area, using estimated vegetated cover within 10 years of installation. Each area restored must be contiguous and a minimum of 2,000 square feet (185.81 square meters).
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and indicates the original area and characteristics of existing native plant communities on site.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the ongoing management activities to protect the integrity of VSPZs.

RECOMMENDED STRATEGIES

- Native plants can express multiple styles of design.
- On sites with existing native plant communities, design the site to minimize damage to existing healthy native plant communities, especially those areas that provide opportunities for wildlife habitat connectivity.

C4.7



Credit 4.8: Optimize biomass

1–6 points

INTENT

Support the water, nutrient, atmospheric gas, and climate regulation ecosystem service benefits provided by vegetation on site by maintaining or establishing regionally appropriate vegetative biomass.

REQUIREMENTS

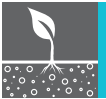
- Conserve and/or restore vegetation biomass on site to a level appropriate to the site's region.
 - Determine the terrestrial biome for the site by using the World Wildlife Fund Wildfinder, www.worldwildlife.org/science/wildfinder.
 - Determine the existing site biomass density index (BDI) and planned site BDI.
 - Determine the points earned in accordance with the site's terrestrial biome and the difference in site BDI according to Tables 4.8 B-E in the Documentation guidance section of the *SITES v2 Reference Guide*.

Calculate existing BDI for the site as it stands prior to site design (see *Pre-Design P2.2: Conduct a pre-design site assessment*). Planned BDI is calculated for the site as designed and anticipated within 10 years of vegetation installation.

RECOMMENDED STRATEGIES

- On greenfield sites, carefully design the site to minimize disruption to existing appropriate vegetation.
- On brownfield sites, carefully design the site to achieve planned BDI 10 years following landscape installation. The long-term capacity of a site to deliver ecosystem services is compromised by overplanting a brownfield site to achieve a target BDI level prematurely.
- Green walls can increase BDI without changing the overall development footprint.
- Be careful to select shade-tolerant and sun-tolerant species that will adjust in the understory as trees and shrubs mature.
- Use trees, green roofs, or vegetated structures (e.g., trellises) to cover non-vegetated surfaces such as walkways, roofs, or parking lots. Select vegetation-based methods to achieve stormwater management goals for the site.
- Before the design phase, examine the appropriate table for your biome (Tables B through E) to make sure that you do not unnecessarily add more layered vegetation than you can earn credit for. Many of the biome tables are limited at the upper end, e.g. Table 4.8C ranging from <1 to >3 is the same point value as going from <1 to >5 planned BDI.

C4.8



Credit 4.9: Reduce urban heat island effects

4 points

INTENT

Minimize effects on microclimate and human and wildlife habitat by using vegetation and reflective materials to reduce heat island effects.

REQUIREMENTS*

Use any combination of the following measures to reduce urban heat island effects for site paving and structures (including roads, sidewalks, courtyards, playgrounds, shelters, and parking lots) according to the formula below:

$$\frac{\text{area of non-roof measures}}{0.5} + \frac{\text{area of high-reflectance roof}}{0.75} + \frac{\text{area of vegetated roof}}{0.5} \geq \text{total site paving area} + \text{total roof area}$$

Alternatively, a solar reflectance index (SRI) and solar reflectance (SR) weighted average approach may be used to calculate compliance.

- Non-roof measures
 - Use the existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Plants must be in place at the time of certification application.
 - Install vegetated planters. Plants must be in place at time of certification application and cannot contain artificial turf.
 - Provide shade with structures covered by energy generation systems that produce renewable energy such as solar thermal heaters, photovoltaics, and wind turbines.
 - Provide shade with architectural devices or structures that have an SR value at installation of at least 0.33 OR a three-year old SR of at least 0.28, and incorporate into the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) activities to ensure these surfaces are cleaned at least every two years to maintain reflectivity.
 - Provide shade with vegetated structures.
 - Use paving materials with an SR of at least 0.33 at installation, OR a three-year aged SR value of at least 0.28, and incorporate into the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) activities to ensure these surfaces are cleaned at least every two years to maintain reflectivity.
 - Use an open-grid pavement system (e.g., concrete-grass lattice) that is at least 50 percent unbound.
- High-reflectance roof
 - Use roofing materials that have an SRI equal to or greater than the values in the table below. Meet either the initial SR value, the three-year aged SR value, or both.

C4.9



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v2009 SS Credit 7.1: Heat island effect—nonroof
- LEED BD+C v2009 SS Credit 7.2: Heat island effect—roof
- LEED BD+C v4 SS Credit 5: Heat island reduction

Section 4: Site Design—Soil + Vegetation

Minimum Solar Reflectance Index Value, By Roof Slope

	Slope	Initial SRI	3-Year Aged SRI
Low-Sloped Roof	≤ 2:12	82	64
Steep-Sloped Roof	> 2:12	39	32

- Vegetated Roof
 - Install a vegetated roof.

Shade calculations must be based on the arithmetic mean of the percent wall and roof coverage at 10 a.m., noon, and 3 p.m. on the summer solstice.

RECOMMENDED STRATEGIES

- Select strategies, materials, and landscaping techniques that reduce heat absorption by exterior surfaces.
- Reduce use of constructed impervious surfaces (e.g., roads, sidewalks, parking lots).
- Increase use of vegetated surfaces and planted areas.
- Use shade from appropriate trees, large shrubs, vegetated trellises, walls, or other exterior structures.
- Consider the use of new coatings and integral colorants for asphalt pavement to achieve light-colored surfaces instead of traditional dark surface materials.
- Position photovoltaic cells to shade impervious surfaces.
- Neither permeable concrete nor permeable asphalt meet the definition of open-grid paving system because both are more than 50 percent impervious. However, the SR of permeable concrete may be greater than 0.33.
- Consider placing parking under cover that complies with the above measures.

C4.9



Credit 4.10: Use vegetation to minimize building energy use

1–4 points

INTENT

Place vegetation or vegetated structures in strategic locations around regularly occupied buildings to reduce energy consumption and costs associated with indoor climate control.

REQUIREMENTS

This credit only applies to sites with regularly occupied buildings or buildings that use HVAC temperature regulation.

Option 1: Reduce energy use

- Use vegetation or vegetated structures to reduce total annual building energy use for heating and cooling by:
 - 5 percent **2 points**
 - 7 percent **4 points**

Option 2: Provide shade structures

- Use vegetation or vegetated structures to shade 100 percent of the exposed surface area of all HVAC units within 10 years of installation.
- AND
- Shade a percentage of the surface area of west, southwest, southeast, and east building façades and 30 percent of total roof area within 10 years of installation as follows:
 - 30 percent **1 point**
 - 60 percent **2 points**

Option 3: Provide a windbreak

- Use trees and dense shrubs to serve as a windbreak for the buildings as follows:
 - One row of trees and dense shrubs that extends for the full length of the building's façades facing the prevailing winter wind **1 point**
 - Two or more rows of trees and dense shrubs in a staggered planting formation, with rows planted 12 to 20 feet (3.66 to 6.10 meters) apart, extending at least 50 feet (15.24 meters) longer than the building's walls facing the prevailing winter wind **2 points**

The windbreak must:

- Be at least 60 feet (18.29 meters) and no more than 200 feet (60.96 meters) from the building walls facing the prevailing winter wind (the windbreak provides ideal wind protection at distances two to five times the mature height of the trees)
- Not cast shadows on the building
- Use densely branched trees and dense shrubs, or a combination of these, branched to the ground in a row or rows to increase the density of the windbreak
- Use spacing guidelines in the resources listed below for trees and shrubs in the windbreak to provide vegetation density that is adequate to protect the building. Spacing between rows and within rows should allow for proper use of suitable maintenance equipment.

Note: Projects can pursue both Option 2 and Option 3.

C4.10

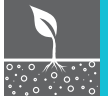


Section 4: Site Design—Soil + Vegetation

RECOMMENDED STRATEGIES

- Consult a local professional (e.g., arborist) for information on plant species that maximize benefits appropriate to the climate. Select tree and shrub species that can provide additional benefits to the site, such as food and habitat for wildlife or visual barriers from highways.
- In addition to trees, use shade trellises, green roofs, green façades, and green walls to increase shading. Select deciduous trees that allow access to the sun in winter and provide shade in summer.
- Vegetated roofs and walls may be an appropriate technique in helping to insulate the building envelope as well as providing ecosystem services such as water retention, habitat, and mentally restorative views for building occupants.

C4.10



Credit 4.11: Reduce the risk of catastrophic wildfire

4 points

INTENT

Reduce the risk of catastrophic wildfire on site and in adjacent landscapes by designing, building, and maintaining sites to manage fuels.

REQUIREMENTS

- Document that the project is in a fire-prone zone (see *Pre-Design P2.2: Conduct a pre-design site assessment*).
- Design, build, and maintain the landscape and structures according to the techniques listed in the “Firewise Landscaping Checklist,” which is Appendix E of *Safer from the Start: A Guide to Firewise-Friendly Developments*, [www.firewise.org/~media/Firewise/Files/Pdfs/Booklets and Brochures/BookletSaferFromtheStart.pdf](http://www.firewise.org/~media/Firewise/Files/Pdfs/Booklets%20and%20Brochures/BookletSaferFromtheStart.pdf).
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes strategies to manage vegetative biomass and fuel loads at responsible levels and to reduce accumulation of dead plant material throughout the vegetated portions of the site. Use prescribed fires or other fuel management techniques in frequencies and intensities similar to the natural fire regime for the ecosystem.

Note: SITES encourages projects to design for scaled resiliency to other catastrophic natural events (e.g., flooding, earthquakes, drought, hurricanes, tornadoes) and encourages projects to apply for *Innovation C10.1: Innovation or exemplary performance* to earn innovation credit for such efforts.

RECOMMENDED STRATEGIES

- Contact local fire departments or state forestry agencies for recommendations on plant spacing, fire-resistant plant species, and fuel management practices appropriate to the local area.
- Use prescribed fires or other fuel management techniques in frequencies and intensities similar to the natural fire regime for the ecosystem.

C4.11





SECTION 5

SITE DESIGN – MATERIALS SELECTION

PREREQUISITE / CREDIT	TITLE	POINTS
Materials P5.1	Eliminate the use of wood from threatened tree species	Required
Materials C5.2	Maintain on-site structures and paving	2-4 points
Materials C5.3	Design for adaptability and disassembly	3-4 points
Materials C5.4	Reuse salvaged materials and plants	3-4 points
Materials C5.5	Use recycled content materials	3-4 points
Materials C5.6	Use regional materials	3-5 points
Materials C5.7	Support responsible extraction of raw materials	1-5 points
Materials C5.8	Support transparency and safer chemistry	1-5 points
Materials C5.9	Support sustainability in materials manufacturing	1-5 points
Materials C5.10	Support sustainability in plant production	1-5 points

Prerequisite 5.1: Eliminate the use of wood from threatened tree species

Required

INTENT

Minimize negative effects on ecosystems by purchasing wood products extracted only from non-threatened tree species.

REQUIREMENTS

This prerequisite applies to all new wood products purchased and installed on the project (e.g., mulch, wood for site furniture, decks, railings, outdoor structures) as well as temporary wood used during construction (e.g., formwork, pallets, scaffolding, sidewalk protection, guardrails).

- Do not use wood species that meet the following criteria (see Resources section):
 - Listed by the Convention on International Trade in Endangered Species (CITES) as threatened with extinction (Appendix I)
 - Listed by CITES as requiring trade controls in order to avoid utilization incompatible with their survival (Appendix II)
 - On the International Union for Conservation of Nature (IUCN) “Red List of Threatened Species” as extinct in the wild (EW), critically endangered (CR), and endangered (EN)
- Threatened tree species are allowed if a recognized third-party sustainable forestry management certification program has certified the wood product per *Materials C5.7: Support responsible extraction of raw materials*.

RECOMMENDED STRATEGIES

- Identify suppliers who provide wood products from sustainably managed forests.
- Consider using recycled plastic or composite lumber instead of wood.

P5.1



Credit 5.2: Maintain on-site structures and paving

2–4 points

INTENT

Extend the life-cycle of building and infrastructure stock, conserve resources, and reduce waste by maintaining existing structures and paving in their existing form.

REQUIREMENTS*

Existing on-site structures and paving that are maintained in situ are eligible for this credit. Regularly occupied buildings, which are outside of the scope of SITES, should not be counted for this credit.

Surface area calculations should include any below-grade components such as foundations and footings, when determination of these elements is feasible. Exclude materials hazardous to plants, animals, or humans from total surface area calculations.

- Maintain existing structures and paving on site for at least:
 - 10 percent of the total existing built surface area **2 points**
 - 20 percent of the total existing built surface area **3 points**
 - 30 percent of the total existing built surface area **4 points**
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and shows all existing on-site structures and paving.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete, details the processes used for maintaining structures and paving to ensure site safety, and meets the needs of the intended uses of the site.

RECOMMENDED STRATEGIES

- Identify and inventory structures (including ones that are subgrade) that can be refurbished and reused in place.
- Clean, repair, and refinish existing structures and paving.

C5.2



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v2009 MR Credit 1.1: Building reuse—maintain existing walls, floors, roofs
- LEED BD+C v2009 MR Credit 1.2: Building reuse—maintain interior nonstructural elements.

Credit 5.3: Design for adaptability and disassembly

3–4 points

INTENT

Minimize materials use and waste flows over the life-cycle of site design projects by increasing the efficient use of materials at construction, facilitating flexibility and adaptation, and increasing the reuse and recycling of materials resulting from renovation and demolition.

REQUIREMENTS

Percentages are based on cost or replacement value. In the case of mixed material assemblies, determine the portion of the total weight that is reusable. Multiply the portion of total weight by the total cost to determine the proportion of product assembly that meets the requirements of this credit (*Materials Worksheet* automatically does this). Plants, rocks, and soils are excluded from this credit.

- Use material assemblies, products, or product components that are designed for disassembly and facilitate reuse for at least:
 - 30 percent of total materials cost, excluding plants, rocks, and soils **3 points**
 - 60 percent of total materials cost, excluding plants, rocks, and soils **4 points**
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete, explains how to replace any deteriorating or damaged components, and lists any proper maintenance techniques.

RECOMMENDED STRATEGIES

- Establish a project goal for future adaptation and renovation of the project and reusable products, and identify material and product suppliers who can help achieve this goal.
- Design construction details to facilitate disassembly without damage to the material:
 - Use reversible connections (e.g., bolts, screws) and avoid the use of mortar, adhesives, welded connections, or nailed connections that cannot be easily removed.
 - Use friction-fit and other mechanical connections that rely on compression or lateral or vertical forces (e.g., mortar-less retaining walls, interlocking sand-laid pavers).
 - Avoid the use of coatings on products for which current industry practice prohibits recycling of the material.
 - Eliminate or reduce the use of composites for which current industry practice prohibits recycling of the material.
 - Use durable and high-quality materials that exceed minimum performance standards.
 - Document as-built drawings if outcome on site is different from design drawings.

C5.3



Credit 5.4: Reuse salvaged materials and plants

3–4 points

INTENT

Conserve resources and avoid landfilling useful materials by reusing salvaged materials and appropriate plants.

REQUIREMENTS*

Percentages are based on cost or replacement value. Soils and new materials with recycled content are excluded from this credit.

- Reuse salvaged materials (including plants) for at least:
 - 10 percent of total materials cost, excluding soils **3 points**
 - 20 percent of total materials cost, excluding soils **4 points**

RECOMMENDED STRATEGIES

- Establish a project goal for salvaged materials and identify material suppliers or local projects that can help achieve this goal by supplying salvaged goods.
- Salvaged plants should be disease-free and show no signs of stress prior to moving
- Some native plant societies will rescue plants prior to construction and can also be a resource for conserving plants off site until they are ready to be reinstalled.

C5.4



* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v2009 MR Credit 3: Materials reuse.

Credit 5.5: Use recycled content materials

3–4 points

INTENT

Reduce the consumption of virgin materials and avoid landfilling useful materials by purchasing products with recycled content.

REQUIREMENTS*

Percentages are based on cost or replacement value. Determine the recycled content value of a material assembly by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

Plants and soils are addressed in other credits and are excluded from this credit. Salvaged or reused materials do not qualify for this credit.

- Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least:
 - 20 percent of total materials cost, excluding plants and soils **3 points**
 - 40 percent of total materials cost, excluding plants and soils **4 points**

RECOMMENDED STRATEGIES

- Establish a project goal for recycled content, and identify material suppliers or local products that can help achieve this goal.
- Strategies that could be used to achieve this credit include:
 - Specifying plastic lumber made with recycled content
 - Using crushed concrete for aggregate bases
 - Specifying new asphalt with recycled asphalt aggregate
 - Specifying high recycled content steel
 - Utilizing spent iron and foundry sand as fine aggregate in concrete

C5.5



* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v2009 MR Credit 4: Recycled content.

Credit 5.6: Use regional materials

3–5 points

INTENT

Reduce energy use for transportation; increase demand for regional materials, plants, and soils; and promote regional identity by supporting the use of local resources.

REQUIREMENTS*

Percent calculations are based on cost or replacement value. If only a fraction of a material is extracted, harvested, recovered, and manufactured within the specified distances, then only that percentage (by weight) shall contribute to the regional value.

- Use materials, plants, and soils that are sourced within the distances specified in the table below such that they constitute at least:
 - 30 percent of total materials cost **3 points**
 - 60 percent of total materials cost **4 points**
 - 90 percent of total materials cost **5 points**

Material Type	Distance Requirements
Soils, compost, and mulch	Extraction, harvest or recovery, and manufacture must occur within 50 miles (80.47 kilometers)
Boulders, rocks, and aggregate	Extraction, harvest or recovery, and manufacture must occur within 50 miles (80.47 kilometers)
Plants	All growing facilities and suppliers for the plant must be within 250 miles (402.34 kilometers)
All other materials	Extraction, harvest or recovery, and manufacture must occur within 500 miles (804.67 kilometers)

RECOMMENDED STRATEGIES

- Identify regional sources for plants, soils, and other landscape materials, including those that are salvaged or reused or contain recycled content.
- Confirm that plant re-wholesalers and retailers obtain their products regionally.
- During construction, ensure that the specified local materials, plants, and soils are installed or used.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v2009 MR Credit 5: Regional materials.

C5.6



Credit 5.7: Support responsible extraction of raw materials

1–5 points

INTENT

Protect ecosystems, respect cultural and community values, and improve land use through responsible extraction of raw materials for site design and construction.

REQUIREMENTS*

The requirements apply to all materials purchased for the project excluding products containing recycled content and salvaged, reused, or refurbished materials. Plants are addressed in other credits and are excluded from this credit. If only part of a composite material or assembly meets the requirements, count only that fraction, based on weight.

Option 1: Advocate for sustainable extraction of raw materials **1 point**

- Submit a letter to all raw materials suppliers and/or materials manufacturers asking them to track and disclose sustainable extraction practices.

Option 2: Support raw material suppliers and/or manufacturers that disclose data on environmental practices **3 points**

- Obtain five percent of the total materials costs (excluding recycled content, salvaged, reused, or refurbished materials) from raw materials suppliers and/or materials manufacturers that:
 - Report annual environmental performance via the Global Reporting Initiative (GRI), or equivalent, including the Mining and Metals supplement, if applicable
 - Provide a publicly available sustainability statement that discloses efforts to achieve sustainable practices

Option 3: Support raw material suppliers and/or manufacturers that meet or exceed standards for raw material extraction **5 points**

- Obtain five percent of the total materials costs (excluding recycled content, salvaged, reused, or refurbished materials) from raw materials suppliers and/or manufacturers that meet one or more of the following criteria:
 - Have third-party verified corporate sustainability reports (CSRs), including statements of environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain
 - Meet responsible extraction criteria for the raw material sources listed below

C5.7



* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v4 MR Credit: 3: Building product disclosure and optimization—sourcing of raw materials.

Section 5: Site Design – Materials Selection

Responsible extraction criteria:

- *Mined or quarried materials:*
 - Follow the Framework for Responsible Mining’s recommendations for Leading Edge Issues
 - Publicly declare a commitment to responsible mining
- *Bio-based materials (excluding hide products):*
 - Bio-based products must meet the Sustainable Agriculture Network’s Sustainable Agriculture Standard
 - Bio-based raw materials must meet ASTM Test Method D6866 and be harvested legally, as defined by the exporting and receiving country
- *New wood products:*
 - Be certified by the Forest Stewardship Council (FSC) (or local equivalent for projects outside the United States)
- *Other extracted materials:*
 - Meet all applicable laws for exporting and receiving countries, including human rights laws
 - Make publicly available a third-party verified corporate sustainability report that includes ALL of the following:
 - > A commitment to long-term ecologically responsible land use
 - > A commitment to reducing environmental harms from extraction and any manufacturing processes
 - > Evidence of economic and social support of adjacent communities
 - > A voluntary commitment to meeting applicable standards or programs that address responsible sourcing criteria
 - > Labor practices
 - > Governance structure

RECOMMENDED STRATEGIES

- Establish project goals for the use of responsibly extracted materials, and identify suppliers early in the project process that can help achieve these goals.
- Write standards into the project specifications that support the goals of this credit.
- During construction administration, ensure that the responsibly extracted materials or products are installed.

C5.7



Credit 5.8: Support transparency and safer chemistry

1–5 points

INTENT

Decrease harmful health and environmental impacts and encourage the use of safer alternatives by promoting the use of materials with available chemical inventories, life-cycle information, and hazard assessments.

REQUIREMENTS*

This credit applies to all of the following product categories and must meet at least one of the four options listed below:

- Decking, railing, fencing, trellises, or lattices (wood and non-wood)
- Pipes, hoses, and irrigation components
- Conduit, wiring, and electrical equipment
- Lighting
- Membranes, liners, and geotextiles
- Fabrics and canvas
- Extruded, spray, or board foams
- Paints and coatings
- Adhesives, sealants, elastomers (e.g., flexible plastics), water proofing, weather stripping, expansion joint filling, and flashing
- Synthetic surfacing materials and associated products (e.g., crumb rubber, artificial turf)

This credit excludes products that are salvaged or reused or refurbished.

Option 1: Advocate for transparency and safer chemistry

1 point

- Submit a letter to all manufacturers for all materials specified in the product categories asking them to develop and disclose chemical inventories or conduct chemical hazard assessments according to the criteria outlined in Options 2 or 3.

C5.8



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v4 MR Credit 2: *Building product disclosure and optimization—environmental product declarations*
- LEED BD+C v4 MR Credit 4: *Building product disclosure and optimization—material ingredients.*

Section 5: Site Design—Materials Selection

Option 2: Support manufacturers that disclose material chemistry and hazards 3 points

- Specify products for at least five percent of the total material costs (excluding products that are salvaged, reused, or refurbished) for all materials included in the product categories, from manufacturers who:
 - Develop chemical inventories covering all chemicals, whether used intentionally or otherwise known to be present, in all life cycle stages of the product
 - In cases where the compilation of a complete chemical inventory is not feasible, the inventory requirements should cover chemicals and their life cycle stages thought to present the greatest hazards to workers, consumers, the general population, and environmental species
 - Report all known hazards and their concentrations regardless of whether the chemical's presence in the product or process is intentional. This reporting includes the identification of any impurities, byproducts, and emissions from finished products or product curing steps.

Option 3: Support manufacturers that have completed chemical hazard assessments 5 points

- Specify products for at least five percent of the total material costs (excluding products that are salvaged, reused, or refurbished) for all materials included in the product categories, from manufacturers who conduct chemical assessments using one of the following screening-level hazard assessment tools (see Resources section):
 - BizNGO's Chemical Alternatives Assessment Protocol
 - GreenScreen for Safer Chemicals
 - U.S. EPA's DfE Alternatives Assessment Criteria for Hazard Evaluation
 - U.S. EPA's Sustainable Futures tool suite (to be used only when measured data is not available)
 - An equivalent robust hazard assessment strategy using recognized and reliable data sources.

RECOMMENDED STRATEGIES

- Use materials without finishes (e.g., dye, paint, gloss) or other chemical additives whenever possible per performance requirements.
- Utilize product certification systems (standards and ecolabels) that incentivize transparency and safer chemistry.
- Prioritize product categories based upon human and environmental risk of exposure.
- Continue open dialogue with all suppliers about your current and future projects' transparency and safer chemistry goals and needs.

C5.8



Credit 5.9: Support sustainability in materials manufacturing

1–5 points

INTENT

Support sustainability in materials manufacturing by specifying and using materials from manufacturers whose practices increase energy efficiency, reduce resource consumption and waste, and minimize negative effects on human health and the environment.

REQUIREMENTS*

The requirements apply to manufacturers of new products purchased for use on site. Rocks, plants, soils, salvaged or reused, or refurbished materials are covered in other credits and are excluded from the calculations for this credit.

Option 1: Advocate for sustainable materials manufacturing **1 point**

Submit a letter to all materials manufacturers asking them to perform, track, and disclose sustainable practices.

Option 2: Support manufacturers that disclose data on sustainable practices **3 points**

Obtain 25 percent of the total applicable materials cost from businesses that complete one of the following actions:

- Report annual environmental performance via the Global Reporting Initiative (GRI) or equivalent
- Conduct and publish a peer-reviewed full life-cycle assessment (LCA) or an environmental product declaration (EPD) for the product
- Set and publicly announce specific goals to reduce, by at least 25 percent (per unit product or equivalent basis) over a five-year period, the company's performance metrics in the following areas:
 - Use of energy, water, and toxics
 - Releases of key pollutants to air and water
 - Disposal of hazardous and non-hazardous wastes

Option 3: Support manufacturers that achieve significant improvements in sustainable practices **5 points**

Obtain 25 percent of the total applicable materials cost from businesses that employ and document at least three of the five achievements below. Percentages are based on cost. If multiple manufacturers are involved in the development of a product, the requirements apply to the manufacturer responsible for producing or assembling the final product.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credit: LEED BD+C v4 MR Credit 2: Building product disclosure and optimization—environmental product declarations.

C5.9



Section 5: Site Design—Materials Selection

Sustainable manufacturing achievements:

1. *Reduce emissions:*

- In at least two of the following three categories, document at least 50 percent reduction (normalized, per unit product or equivalent basis) in the company's direct environmental impacts over the most recent 10-year period where data are available.
 - Emission of hazardous air pollutants (per U.S. Clean Air Act or local equivalent for projects outside the United States)
 - Emission of toxic water pollutants (per U.S. Clean Water Act or local equivalent for projects outside the United States)
 - Generation of hazardous and non-hazardous waste (per U.S. Resource Conservation and Recovery Act or local equivalent for projects outside the United States).

2. *Reduce or offset greenhouse gas emissions:*

- The product manufacturer demonstrates that the three lowest years for carbon emissions (or global warming potential equivalent, per unit of product) in the previous 10 years are at least 25 percent better than its corresponding 10-year average (per unit of product) OR the product manufacturer purchases carbon offsets from a legally binding trading system that provides independent third-party verification for 25 percent of its carbon emissions (or global warming potential equivalent).

3. *Reduce energy consumption:*

- Demonstrate that the manufacturing process per unit of product consumes 25 percent less energy than the industry average. Consult the National Institute of Standards and Technology Building for Environmental and Economic Sustainability (BEES), National Renewable Energy Laboratory (NREL) U.S. Life-Cycle Inventory Database, or Commercial Buildings Energy Consumption Survey for industry-specific data (see Resources section).

4. *Use renewable energy sources:*

- Use on-site renewable energy sources to meet 10 percent of electricity demands OR engage in at least a four-year contract for the purchase of 20 percent of electricity from renewable sources for the facility at which the product is made.

5. *Reduce use of potable water:*

- Use potable or other natural surface or subsurface water resources for less than 25 percent of total water consumption during manufacturing for the product line specified (i.e., non-potable sources are used to meet 75 percent of water consumption).

C5.9



RECOMMENDED STRATEGIES

- Identify and select materials from manufacturers that actively implement better business practices to reduce negative impacts to human health and the environment. For example, a site could meet the low point requirements for this credit by selecting wooden benches (for 10 percent of total costs) from a manufacturer that meets the requirements for reduced potable water and energy use, and selecting concrete (for 15 percent of total costs) from a manufacturer that has conducted a LCA and uses at least 10 percent renewable energy.

Credit 5.10: Support sustainability in plant production

1–5 points

INTENT

Support sustainable practices in plant production by purchasing plants, sod, and seed from providers whose practices increase energy efficiency, reduce resource consumption and waste, and minimize negative effects on human health and the environment.

REQUIREMENTS

The requirements apply to the businesses from which plants, sod, and seed are purchased for the site. If multiple businesses are involved in plant production, the requirements apply to the business that grows the plant material until it is ready for sale (finishes the plant material). Percentages are based on cost.

Option 1: Advocate for sustainable plant production **1 point**

Submit a letter to all businesses from which plants, sod, and seed are purchased asking them to perform, track, and disclose sustainable practices in plant production.

Option 2: Support producers that disclose data on sustainable practices **3 points**

Obtain 80 percent of purchased plants, sod, and seed from businesses that have a publicly available sustainability statement that discloses efforts to achieve at least six of the 10 practices listed below.

Option 3: Support producers that achieve significant improvements in sustainable practices **5 points**

Obtain 80 percent of purchased plants, sod, and seed from businesses that achieve at least six of the 10 sustainable practices listed below.

Sustainable practices in plant production:

1. *Reduce use of potable water or other natural surface or subsurface water resources:* Use non-potable water (e.g., captured rainwater, recycled graywater, reclaimed/treated wastewater, water treated and conveyed by a public agency specifically for non-potable uses) for 50 percent of the total annual irrigation volume or reduce total irrigation volume by 50 percent.
2. *Reduce runoff from irrigation:* Capture and recycle all irrigation runoff water on site (i.e., no dry-weather discharges).
3. *Choose sustainable soil amendments and growing media:* Use peat-free growing media or other sustainable sources. Use cover crops and amend soils with compost, manure, or other sustainable sources.
4. *Recycle organic matter:* Compost or recycle 100 percent of vegetation trimmings on site for use in nursery operations or for sale to the public.
5. *Reduce waste:* Conduct a waste audit to identify the weight or volume of ongoing consumables, and reuse, recycle, or compost 50 percent of the on-going consumables waste stream.
6. *Use integrated pest management (IPM):* Employ a certified IPM practitioner OR use an IPM-certified nursery.
7. *Prevent use and distribution of invasive species:* Demonstrate that invasive species are managed and are not distributed.

C5.10



Section 5: Site Design—Materials Selection

8. *Reduce energy consumption:* Demonstrate that the energy use during the three most recent years is at least 25 percent less than the average energy use over the previous 10 years.
9. *Use renewable energy sources:* Use on-site renewable energy sources to meet 10 percent of electricity demands OR engage in at least a four-year contract for the purchase of 20 percent of electricity from renewable energy sources.
10. *Provide safe and fair working conditions:* Develop nursery employment policies in order to establish open communication with employees about issues such as workplace safety and job satisfaction.

RECOMMENDED STRATEGIES

- Identify and select plants from nurseries that actively implement better business practices to reduce damage to the environment and conserve resources.
- Contact state and regional nursery and other plant producer associations to identify growers using sustainable practices in plant production. Also contact USDA extension offices to help identify suppliers.

C5.10





SECTION 6

SITE DESIGN – HUMAN HEALTH + WELL BEING

PREREQUISITE / CREDIT	TITLE	POINTS
HHWB C6.1	Protect and maintain cultural and historic places	2-3 points
HHWB C6.2	Provide optimum site accessibility, safety, and wayfinding	2 points
HHWB C6.3	Promote equitable site use	2 points
HHWB C6.4	Support mental restoration	2 points
HHWB C6.5	Support physical activity	2 points
HHWB C6.6	Support social connection	2 points
HHWB C6.7	Provide on-site food production	3-4 points
HHWB C6.8	Reduce light pollution	4 points
HHWB C6.9	Encourage fuel efficient and multi-modal transportation	4 points
HHWB C6.10	Minimize exposure to environmental tobacco smoke	1-2 points
HHWB C6.11	Support local economy	3 points

Credit 6.1: Protect and maintain cultural and historic places

2–3 points

INTENT

Enhance a site's identity and meaning by protecting and maintaining significant historic buildings, structures, and objects, as well as cultural landscapes.

REQUIREMENTS*

Option 1: Historic buildings, structures, or objects

2 points

- Identify and protect existing historic buildings, structures, and objects that are included, or are eligible for inclusion, in one of the following:
 - A local historic register
 - A state historic register
 - The U.S. National Register of Historic Places, which includes National Historic Landmarks (or local equivalent for projects outside the United States)
 - The Native American/American Indian tribal register
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. It must outline long-term strategies and short-term tasks to achieve preservation maintenance goals for the site or the site's cultural or historic features.

Option 2: Historic or cultural landscapes

3 points

- Identify and protect existing historically significant cultural landscapes that are included, or are eligible for inclusion, in one of the following:
 - A local historic register
 - A state historic register
 - The U.S. National Register of Historic Places, which includes National Historic Landmarks (or local equivalent for projects outside the United States)
 - The Native American/American Indian tribal register
 - A conservation easement register
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. It must outline long-term strategies and short-term tasks to achieve preservation maintenance goals for the site or the site's cultural or historic features.

RECOMMENDED STRATEGIES

- Communicate with the local community; local, state, federal, and Native American/American Indian Tribal preservation agencies; educational facilities; and historical associations to identify important cultural or historic landscapes to protect and incorporate into site design.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED ND v2009 *GIB Credit 6: Historic resource preservation and adaptive use*
- LEED ND v4 *GIB Credit 6: Historic preservation and adaptive use*

C6.1



Credit 6.2: Provide optimum site accessibility, safety, and wayfinding

2 points

INTENT

Increase site users' ability to understand and access outdoor spaces by incorporating elements of accessibility, safety, and wayfinding into the site design.

REQUIREMENTS

- Enable site use by including the following elements in the project design:
 - Accessibility*: Provide site access and usability as required by local and national accessibility standards (e.g., Americans with Disabilities Act)
 - Safety: Improve actual and perceived safety of site users by providing at least four of the six components below:
 - > Clear, defined spaces and access control
 - > Natural surveillance with adequate lighting levels
 - > Natural surveillance at entrances and walkways
 - > Clear visibility and good sight lines
 - > A variety of options for access
 - > Site design elements that improve the effectiveness of policing and security efforts
 - Wayfinding: Create an environment that makes it easy and intuitive for users to orient themselves and navigate from place to place, by providing at least five of the eight components below:
 - > Clear entrances and gateways
 - > Viewpoints and sight lines
 - > Landmarks
 - > Decision points or nodes
 - > Hierarchy of pedestrian and vehicular circulation
 - > Distinct areas and regions
 - > Orientation devices and systems
 - > Maps and brochures

* Note: This requirement does not apply to single-family residential projects.

RECOMMENDED STRATEGIES

- To address safety and accessibility concerns during site design, identify techniques appropriate to the site type and user groups.
- Identify techniques to improve legibility and understanding of the site's layout and intended uses.
- Consider implementing the elements to enable site use without compromising sensitive site features.
- Adapt universal design practices to enable all users to participate equally in access and enjoyment of site features and amenities.

C6.2



Credit 6.3: Promote equitable site use

2 points

INTENT

Provide economic and social benefits to the local community by providing publicly available on-site events, facilities, amenities, or programming.

REQUIREMENTS

- Achieve *Pre-Design C2.4: Engage users and stakeholders*.*
- Achieve two of the following four SITES credits:
 - *HHWB C6.4: Support mental restoration*
 - *HHWB C6.5: Support physical activity*
 - *HHWB C6.6: Support social connection*
 - *Education C9.1: Promote sustainability awareness and education*
- Provide free public site access to four specific, equitable site elements (which may include some combination of amenities, activities, facilities, programs, or events) in the first three years of operation. Elements must be associated with the above credits that have been identified by the local community as a need or desirable element.

* *Note:* This requirement does not apply to single-family residential projects.

RECOMMENDED STRATEGIES

- Actively engage with the local community to identify needs and develop options to generate or share the economic and social benefits of the site.
- Permanent elements and temporary installations may promote benefits for different user groups. Select options that allow use of the site to benefit and engage a wide range of local residents, beyond the primary user groups.

C6.3



Credit 6.4: Support mental restoration

2 points

INTENT

Improve human health and well-being by providing visual and physical connections to restorative outdoor spaces.

REQUIREMENTS

- Provide accessible, quiet outdoor spaces that include:
 - Seating for five percent of total site users
 - Visual and physical access to vegetation
 - Elements that reduce noise and mitigate negative distractions
 - Elements that address microclimate and other site-specific conditions (e.g., sun, shade, wind)
- For sites with regularly occupied buildings, provide unobstructed views of vegetation from 50 percent of common spaces (e.g., office spaces, classrooms, waiting rooms, living areas, dining rooms).

Note: A project cannot achieve this credit for the same space that is submitted for *HHWB C6.6: Support social connection*. SITES encourages the development of multiple types of spaces to serve the intents of both credits; therefore, submit two separate spaces in order to achieve both credits.

RECOMMENDED STRATEGIES

- During the site assessment process, identify areas that are quiet and could optimize the mental health benefits for site users. Look for shade trees, views, or site landmarks as well as potential stressful factors on or off site.
- During site planning and design, meet with stakeholders and potential site users to identify needs and techniques appropriate to the site type and user groups. Work with designers to design the project so that buildings can optimize views and deflect surrounding noise.
- Design a variety of smaller, mentally restorative spaces conveniently located throughout a site rather than one large space. If possible, consider integrating these outdoor spaces with interior public spaces to enhance the connection to nature throughout a site.
- Design the outdoor mental restoration spaces away from distractions, such as noise from mechanical systems, building and facility operations, and traffic. To minimize noise, incorporate multiple solutions such as quieter pavement or road surfacing, dense foliage, earth berms, and barriers or screens. Schedule maintenance activities when site users are not present.
- To create a sense of enclosure, define seating areas with low walls, fences, vegetation, or topography. Walls, fences, and vegetation can also break, guide, deflect, or filter the wind and thereby alter its effects.
- Provide a variety of seating options within defined spaces. Consider providing comfortable, moveable seating in both sun and shade.
- Design the site with protective windbreaks, awnings, and other sources of shade where necessary. Use vegetation, green walls, or barriers to minimize or buffer excessive wind, sunlight, traffic, or unsightly features.
- Provide amenities or vegetation that enhance a multi-sensory aesthetic experience, such as a grove of trees, water features, scents from flowers or foliage, tactile variation, or art.

C6.4



Credit 6.5: Support physical activity

2 points

INTENT

Improve human health by providing on-site opportunities that encourage outdoor physical activity.

REQUIREMENTS

- Estimate the total number of site users and the peak times of use.
 - Identify, describe, and list the four largest user groups.
- Develop and implement a functional plan that encourages outdoor physical activity for the largest four distinct user groups identified.
- Provide services to support site users during physical activity (e.g., drinking fountains, bicycle racks, emergency call boxes).
- Provide at least two of the following five outdoor physical activity features:
 - On-site trail or bicycle path that is a minimum of one mile (1.61 kilometers) in length, and is either a closed loop or has a turn-around at both ends.
 - > If connecting to either an off-site bicycle lane or multi-use trail that meets the local minimum standards, the on-site trail or bicycle path must be a minimum of 0.5 miles (0.8 kilometers) in length.
 - Playgrounds that are physically challenging and engaging
 - Fitness courses (e.g., pull-up bars, disc golf, steps, inclined surfaces)
 - Physical activity programs (e.g., yoga classes, tai chi, regular sports programs) to be established within six months of project completion
 - Scheduled events that support physical activity (e.g., tournaments, races)

RECOMMENDED STRATEGIES

- Identify potential site users and the physical activities preferred by intended user groups.
- Locate desirable and accessible spaces on site to enable and encourage physical activity.
- For small sites, creatively design meandering pathways to maximize on-site physical activity opportunities.
- If public sidewalks are used as part or all of a trail or pathway, conduct a walkability audit to assess the safety and desirability of the walking routes.
- If a private site provides access to the public, consider pedestrian level lighting as part of the design.
- For larger sites, provide a variety of opportunities for active living that may physically challenge the users and offer seating at key nodes of activity.

C6.5



Credit 6.6: Support social connection

2 points

INTENT

Strengthen community and encourage social connections by providing outdoor gathering spaces to support people gathering, eating, working, and playing together.

REQUIREMENTS

- Provide outdoor spaces to encourage social connection that include:
 - Seating for a minimum of 10 percent of the total site users that accommodates a variety of group sizes and is appropriate to the site
 - Elements that address microclimate and other site-specific conditions (e.g., sun, shade, wind)
 - Amenities, services, or activity spaces (e.g., games, wireless access, food concessions, picnic or dining areas, outdoor auditoriums, playgrounds, farmers' markets)

Note: A project cannot achieve this credit for the same space that is submitted for *HHWB C6.4: Support mental restoration*. SITES encourages the development of multiple types of spaces to serve the intents of both credits; therefore, submit two separate spaces in order to achieve both credits.

RECOMMENDED STRATEGIES

- During the site assessment process, identify areas that could accommodate moderate and large groups. To find areas that may encourage social connection, look for shade trees or views.
- During site planning and design, meet with stakeholders and potential site users to identify needs and appropriate techniques.
- Design a variety of smaller social spaces conveniently located throughout a site rather than one large space.
- Moveable seating is preferred, if possible. Enclose and define seating areas with low walls or vegetation. Provide comfortable seating in sun and shade.
- Consider the needs of a variety of user groups. Provide seating, games, and spaces specifically designed for children, such as a tot-lot playground.

C6.6



Credit 6.7: Provide on-site food production

3–4 points

INTENT

Improve human health and well-being, community involvement, and education about food production and nutrition by designing and managing food production on site.

REQUIREMENTS

- Provide for on-site food production including vegetable gardens or edible nut and fruit-bearing plants appropriate to the site (see *Soil+Veg P4.3: Use appropriate plants*).

Option 1: Food production

3 points

- Dedicate a minimum of 10 percent of the site's final vegetated area to food production.
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and describes how site conditions are appropriate for food production.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and details practices for maintaining a food-producing garden.

Option 2: Food production and regular distribution

4 points

- Dedicate a minimum of 10 percent of the site's final vegetated area to food production (e.g., community gardens) and distribute or sell food produced to site users and the community (e.g., farmers' market, local food sources, restaurants, schools, hospitals, and community supported agriculture).
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and describes how site conditions are appropriate for food production.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and details specific practices for maintaining a food-producing garden.

C6.7



Section 6: Site Design—Human Health + Well-Being

RECOMMENDED STRATEGIES

- Research historical uses of the site and surrounding context to determine the potential for in-ground and airborne contaminants. If needed, consult environmental professionals for acceptable databases.
- Contaminated soils can negatively affect the healthfulness of food crops. Sites should be evaluated regarding their safety for food production (e.g., be aware of previously developed sites, including those previously used as orchards for nut or fruit production, and brownfield sites that may have contaminated soils). To certify the site's soils and plants produced in them do not pose a health risk, it is recommended that only a qualified environmental professional determine the safety of the site for food production.
- Contact local or county cooperative extension offices to determine which soil tests are available to check for potential contaminants harmful to human health. Recommended soil tests and sampling protocol must meet local, state, and federal regulatory standards.
- Use organic gardening methods to reduce human consumption of harmful chemicals.
- Use various gardening methods (e.g., greenhouses, raised beds, container gardens) to provide alternative spaces for food production and reduce risk if contaminated soils are present and not remediated.
- Harvest rainwater or use another sustainable water harvesting method that minimizes the use of potable water.
- If food waste and vegetation trimmings are generated on site, incorporate this waste material into composting strategies.
- Practices in animal husbandry may be considered for credit in *Innovation C10.1 Innovation in site design*, with adequate documentation proving the design meets state and local regulations.

C6.7



Credit 6.8: Reduce light pollution

4 points

INTENT

Minimize negative effects on nocturnal environments and human health and functioning, reduce sky-glow, and increase nighttime visibility by reducing light trespass on site.

REQUIREMENTS*

In order to reduce light pollution:

- Meet uplight and light trespass requirements for all exterior luminaires located inside the project boundary (except those listed under “Exemptions”) using one of the two methods below, based on:
 - The photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design
 - The lighting zone of the project property (at the time construction begins). Classify the project under one lighting zone using the definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide.

Note: Projects may use different methods for uplight and light trespass (backlight and glare).

- For internally illuminated exterior signage within the project boundary:
 - Do not exceed a luminance of 200 candelas per square meter (nits) during nighttime hours and 2,000 candelas per square meter (nits) during daytime hours. Illumination for front-lighted signage is considered façade or landscape lighting and must comply with uplight and light trespass lighting requirements.

Method 1: BUG rating method

Do not exceed the luminaire backlight, uplight, and glare (BUG) ratings (see Tables 6.8-A through C) for the project’s MLO lighting zone, based on the specific light source installed in the luminaire. Backlight and glare ratings are also based on the mounting location and distance from the lighting boundary. For guidance on determining ratings for luminaires, refer to the Documentation guidance section below.

The lighting boundary is the SITES project boundary. The lighting boundary can be modified under the following conditions:

- When the lighting boundary abuts a public area that is a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to five feet (1.5 meters) beyond the property line.
- When the lighting boundary abuts a public roadway or public transit corridor, the lighting boundary may be moved to the center line of that roadway or corridor.
- The lighting boundary may be expanded to include additional properties contiguous to the SITES project if the additional property is owned by the same entity and has the same or higher MLO lighting zone designation.

* Components of this credit were adapted from the U.S. Green Building Council’s LEED credit: LEED BD+C v4 SS Credit 6: *Light pollution reduction*.

C6.8



Section 6: Site Design—Human Health + Well-Being

Orient all luminaires located at a distance that is less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary line. The backlight rating requirement excludes building-mounted luminaires with the backlight oriented toward the building.

Backlight ratings

Table 6.8-A

MLO lighting zone	Allowed BACKLIGHT ratings for luminaire mountings			
	> 2 mounting heights from lighting boundary	1 to 2 mounting heights from lighting boundary and properly oriented	0.5 to 1 mounting height to lighting boundary and properly oriented	< 0.5 mounting height to lighting boundary and properly oriented
LZ0	B1	B1	B0	B0
LZ1	B3	B2	B1	B0
LZ2	B4	B3	B2	B0
LZ3	B5	B4	B3	B1
LZ4	B5	B4	B3	B2

Refer to Table 6.8-G in *SITES v2 Reference Guide* to determine lumen requirements for backlight ratings B0—B5.

Uplight ratings

Table 6.8-B

MLO lighting zone	Luminaire UPLIGHT rating
LZ0	U0
LZ1	U1
LZ2	U2
LZ3	U3
LZ4	U4

Refer to Table 6.8-H in *SITES v2 Reference Guide* to determine lumen requirements for uplight ratings U0—U4.

C6.8



Section 6: Site Design—Human Health + Well-Being

Glare ratings

Table 6.8-C

MLO lighting zone	Allowed GLARE ratings for luminaire mountings				
	Building-mounted > 2 mounting heights from any lighting boundary	Building-mounted 1–2 mounting heights from any lighting boundary	Building-mounted 0.5 to 1 mounting heights from any lighting boundary	Building-mounted < 0.5 mounting heights from any lighting boundary	All other luminaires
LZ0	G0	G0	G0	G0	G0
LZ1	G1	G0	G0	G0	G1
LZ2	G2	G1	G0	G0	G2
LZ3	G3	G1	G1	G0	G3
LZ4	G4	G2	G1	G1	G4

Refer to Table 6.8-I and Table 6.8-J in *SITES v2 Reference Guide* to determine lumen requirements for glare ratings G0—G5.

Method 2: Calculation method

Uplight

Do not exceed the following percentages of total lumens emitted above horizontal:

Table 6.8-D

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.50%
LZ3	3%
LZ4	6%

Light trespass (backlight and glare)

Do not exceed the following vertical illuminances at the lighting boundary. (Use the definition of lighting boundary in Method 1). Calculation points may be no more than five feet (1.5 meters) apart. Calculate the vertical illuminance on vertical planes running parallel to the lighting boundary. The normal to each plane should be oriented toward the property and perpendicular to the lighting boundary, extending from grade level to 33 feet (10 meters) above the height of the highest luminaire.

C6.8



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Table 6.8-E

MLO lighting zone	Maximum vertical illuminance at the lighting boundary
LZ0	0.05 footcandles
LZ1	0.05 footcandles
LZ2	0.10 footcandles
LZ3	0.20 footcandles
LZ4	0.60 footcandles

Exemptions from uplight and light trespass requirements

The following exterior lighting is exempt from the requirements, provided it is controlled separately from the nonexempt lighting:

- Specialized signal, directional, and marker lighting for transportation
- Lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 a.m.
- Lighting that is integral to other equipment or instrumentation that has been installed by the equipment or instrumentation manufacturer
- Lighting for theatrical purposes for stage, film, and video performances
- Government-mandated roadway lighting
- Hospital emergency departments, including associated helipads
- Lighting for the national flag in MLO lighting zones 2, 3, or 4
- Internally illuminated signage

RECOMMENDED STRATEGIES

- Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution.
- Control the direction and spread of light by choosing the correct type of light fixtures. Consider using Illuminating Engineering Society (IES) “full cut off” or “fully shielded” designated fixtures, which means that no light is visible above the lowest light emitting part of the fixture.
- The Dark Sky Society recommends “Top-mounted sign lighting...with RLM (dish) type shields, provided that the light falls entirely on the sign and is positioned so that the light source (bulb) is not visible from any point off the property or into the roadway.”
- Consider hiring a professional lighting designer to strategically place lighting over 15,000 lumens or accent and wayfinding lighting.

C6.8



Credit 6.9: Encourage fuel efficient and multi-modal transportation

4 points

INTENT

Reduce emissions and promote a healthy lifestyle by encouraging and supporting efficient and adaptable modes of transportation.

REQUIREMENTS*

- Provide at least three of the following options:
 - Preferred parking for vehicles that have reduced emissions and/or high fuel-efficiency for three percent of the total vehicle parking capacity of the site
 - Preferred parking for carpools or vanpools for three percent of the total vehicle parking capacity
 - Parking capacity that is reduced by 20 percent from the base ratios, as recommended by the Parking Consultants Council (shown in the *Institute of Transportation Engineers' Transportation Planning Handbook*, 3rd Edition, Tables 18-2 through 18-4)
 - Site amenities at structured bus shelters (e.g. appropriate weather protection structures, seating, waste and recycling receptacles)
 - Electric re-charge stations or alternative fuel stations
 - Short-term bicycle parking for no less than six bicycles within 50 feet (15.24 meters) of each primary entrance of a building and long-term bicycle parking, either enclosed and secured or within 200 feet (60.96 meters) of inhabited buildings, for seven percent of the building's total users
 - Infrastructure, facilities, or incentives to promote shared usage such as carpool drop-off areas, car-share programs, bicycle-share programs, and shuttle services to mass transit
- Ensure the section of the site assessment (see *Pre-Design P2.2: Conduct a pre-design site assessment*) is complete and includes locations of the existing or planned pedestrian, bicycle, or transit routes and any existing parking.

RECOMMENDED STRATEGIES

- Provide transportation facilities such as alternative fuel refueling stations.
- Provide fuel-efficient vehicles for employee use during the workday.
- Support for bicycle riders may include access to bicycle racks, on-site showers, enclosed parking lockers, and flexible work scheduling to avoid rush hour traffic congestion.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v2009 SS Credit 4: *Alternative transportation*
- LEED BD+C v4 LT Credit 6: *Bicycle facilities*
- LEED BD+C v4 LT Credit 7: *Reduced parking footprint*
- LEED BD+C v4 LT Credit 8: *Green vehicles*

C6.9



Credit 6.10: Minimize exposure to environmental tobacco smoke

1–2 points

INTENT

Improve human health by minimizing site users' exposure to environmental tobacco smoke (i.e., secondhand smoke).

REQUIREMENTS*

Option 1: Designate smoke-free zones

1 point

- Develop and implement a smoke-free policy to prohibit smoking outdoors within 25 feet (7.62 meters) of all regularly occupied building entries, operable windows, air intakes, bus stops, parking for persons with disabilities, patios, overlooks, playgrounds, recreational fields, and other outdoor gathering areas where people could inadvertently come in contact with tobacco smoke when occupying, entering, or leaving the site.
- Clearly designate outdoor smoking areas that meet the above requirements and provide adequate waste disposal. Permanent signage indicating the smoke-free policy must be installed within 10 feet (3.05 meters) of all building entrances.*
- Ensure employees, contractors, and visitors will be informed and asked to comply with the smoke-free policy.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and outlines the long-term strategies to monitor the smoke-free policy for compliance by all employees, contractors, and visitors to the site.

Option 2: Prohibit smoking on site

2 points

- Develop and implement a smoke-free policy to prohibit smoking within the entire site.
- Install permanent signage indicating the smoke-free policy.*
- Ensure employees, contractors, and visitors will be informed and asked to comply with the smoke-free policy.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and outlines the long-term strategies to monitor the smoke-free policy for compliance by all employees, contractors, and visitors to the site.

* *Note:* This step is not required for single-family residential projects.

RECOMMENDED STRATEGIES

- In locating exterior smoking areas, take into account prevailing winds and microclimate effects.
- To limit the effects of tobacco smoke on site users, consider innovative techniques such as placing filters near air intakes or creating outdoor smoke rooms.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v2009 EQ Prerequisite 2: Environmental tobacco smoke control
- LEED BD+C v4 EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) control

C6.10



Credit 6.11: Support local economy

3 points

INTENT

Provide economic and social benefits to the local community during site construction by providing employment opportunities and purchasing local materials and services.

REQUIREMENTS

- Hire a local workforce and support local businesses during the construction phase by doing two or more of the following steps:
 - Commit to employing no fewer than 75 percent of workers at or above a living wage requirement during construction of the site.
 - Employ local individuals for 75 percent of new hires during the construction phase.
 - Employ low-income individuals for 75 percent of new hires during the construction phase.
 - Support on-the-job training by hiring individuals from government-sponsored, union, or accredited educational programs such as GreenCorps, Jobcorps, VISTA or AmeriCorps.
 - Purchase materials and construction services equal to 10 percent or more of the construction budget from locally owned and operated businesses.

RECOMMENDED STRATEGIES

- Actively engage with the local community to identify and develop options for sharing the economic and social benefits of the site's development.
- Select options that allow the site's development to benefit a wide range of local residents, beyond the primary user groups.
- Contact union and other worker organizations to identify potential workforce hires for the project.

C6.11





SECTION 7

CONSTRUCTION

PREREQUISITE / CREDIT	TITLE	POINTS
Construction P7.1	Communicate and verify sustainable construction practices	Required
Construction P7.2	Control and retain construction pollutants	Required
Construction P7.3	Restore soils disturbed during construction	Required
Construction C7.4	Restore soils disturbed by previous development	3-5 points
Construction C7.5	Divert construction and demolition materials from disposal	3-4 points
Construction C7.6	Divert reusable vegetation, rocks, and soil from disposal	3-4 points
Construction C7.7	Protect air quality during construction	2-4 points

Prerequisite 7.1: Communicate and verify sustainable construction practices

Required

INTENT

Ensure site performance by communicating and verifying the implementation of sustainable practices throughout the construction process.

REQUIREMENTS

- Designate an integrated design team member (see *Pre-Design P2.1: Use an integrative design process*), other than the contractor, who will be responsible for verifying the site is built per the construction specifications and drawings.
- Before construction starts, hold a meeting that includes at least one person from each discipline from the integrated design team, plus the major subcontractors.
 - Review construction specifications and drawings and convey the project's sustainability principles and performance goals to the contractor and subcontractors.
 - Review the steps needed to achieve all the prerequisites and pursued credits.
 - Hold additional meetings as necessary when additional subcontractors are hired.
- Prior to construction, create a SITES Punchlist that assigns responsibility for each prerequisite and desired credit in a worksheet (see *SITES Punchlist Worksheet*) to a member of the integrated design team. That person will sign off on each assigned item as it is implemented.

RECOMMENDED STRATEGIES

- Provide *SITES Punchlist Worksheet* for distribution to contractor prior to the beginning of construction. Update and re-issue it as construction progresses.
- Encourage the site contractor to designate a staff person to track SITES-related work and communicate with the integrated design team as needed from design phase through maintenance period.
- To increase awareness of critical path items, coordinate with construction sequencing to produce and distribute a graphic timeline for *SITES Punchlist* items.
- Discuss resources (i.e., budget, staff, volunteers, equipment, and materials) available during the construction process. Determine short- and long-term sustainability principles and performance goals.

P7.1



Prerequisite 7.2: Control and retain construction pollutants

Required

INTENT

Protect receiving waters (including surface water, groundwater, and combined sewers or stormwater systems), air quality, and public safety by preventing and minimizing the discharge of construction site pollutants and materials.

REQUIREMENTS*

- Create and implement an erosion, sedimentation, and pollutant control plan, commonly referred to as a stormwater pollution prevention plan (SWPPP) or erosion and sedimentation control plan (ESC) for all construction activities associated with the project.
 - Regardless of project size, the plan (SWPPP or ESC) must conform to erosion and sedimentation requirements of the most current version of the U.S. EPA Construction General Permit (or local equivalent from projects outside the United States) or local erosion and sedimentation control standards and codes, whichever is more stringent. The plan must list the best management practices (BMPs) employed and describe how the BMPs accomplish the following objectives:
 - > Prevent loss of soil during construction by stormwater runoff or wind erosion, including protecting topsoil by stockpiling or covering for reuse.
 - > Prevent and reduce sediment discharges into storm conveyances, receiving waters, or other public infrastructure components or systems.
 - > Prevent polluting the air with dust and particulate matter.
 - > Prevent runoff and infiltration of other pollutants from construction sites (e.g., thermal pollution, concrete wash, fuels, solvents, hazardous chemical runoff, high or low pH discharges, pavement sealants) and ensure proper disposal of all construction related materials.
 - > Protect any Vegetation and Soil Protection Zones (VSPZs) and other areas of vegetation that will remain on site from construction activities.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and describes the on-going management activities to protect the integrity of VSPZs.

Note: The construction phase of the project is considered complete when the site is stabilized, a notice of termination is filed, or a notice of substantial completion is issued.

The construction general permit (CGP) outlines the provisions necessary to comply with Phase I and Phase II of the U.S. EPA National Pollutant Discharge Elimination System (NPDES) program (or local equivalent for projects outside the United States). Although the CGP applies only to sites greater than one acre (0.40 hectares), its requirements are applied to all projects for the purposes of this prerequisite.

* Components of this credit were adapted from the U.S. Green Building Council's LEED credit:

- LEED BD+C v2009 SS *Prerequisite 1: Construction activity pollution prevention*
- LEED BD+C v4 SS *Prerequisite 1: Construction activity pollution prevention*

P7.2



Section 7: Construction

RECOMMENDED STRATEGIES

- Employ strategies such as a combination of temporary and permanent seeding, mulching, earth dikes, sediment traps, sediment basins, filter socks, compost berms and blankets, secondary containment, spill control equipment, hazardous waste manifests, and overfill alarms.
- Implement post-construction stormwater management with construction sequencing (e.g., infiltration systems constructed or rehabilitated at the end of the project). Account for weather conditions during construction activities to minimize unintended chemical dispersal or other adverse effects on and off site (e.g. apply pavement sealers and perform mass-grading operations only when no rain is predicted).

P7.2



Prerequisite 7.3: Restore soils disturbed during construction

Required

INTENT

Support healthy plants, biological communities, water storage, and infiltration by restoring soils disturbed during construction.

REQUIREMENTS

Restore all soils on site that have been disturbed by current construction activities and that will serve as the final vegetated area (regardless whether the pre-construction soil condition was classified as healthy or disturbed):

- Locate reference soils to guide performance criteria that are appropriate for the site's vegetation, intended program, and site elements.
 - If identified reference soils are not appropriate for the design intent, explain why and describe the soil characteristics that will guide soil restoration treatment efforts. (See *Pre-Design P2.2: Conduct a pre-design site assessment* and *Soil+Veg P4.1: Create and communicate a soil management plan*.)
- Restore soils to a minimum depth of 12 inches (30.48 centimeters).
 - Where planting trees, restore soils to a greater depth and volume to support (biologically, structurally, hydrologically, and geotechnically) the intended mature tree canopy.
- Test restored (final) soil conditions to ensure the following soil restoration criteria are met:
 1. **Organic matter** (required):
 - Achieve appropriate organic matter for plant growth, water storage, and infiltration. Amend soils with mature, stable compost such that, at minimum, the top 12 inches of soil (30.48 centimeters) contain at least three percent organic matter or organic matter levels and depths that are comparable to the site's reference soil and appropriate for vegetation and program needs. Do not use sphagnum peat or organic amendments that contain sphagnum peat.
 - Acceptable test methods for determining soil organic matter include the most current version of ASTM D2974 Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils and TMECC 05.07A Loss-On-Ignition Organic Matter Method.
 2. **Compaction** (field test or undisturbed core sample only):
 - Ensure bulk densities within 100 percent of the root zone do not exceed the maximum values given in Figure 7.3-A or Figure 7.3-B in the Documentation guidance section of the *SITES v2 Reference Guide*.

OR

Infiltration (field test only):

 - Achieve infiltration rates (inches or centimeters per hour) or saturated hydraulic conductivity (millimeters per second) comparable to the site's reference soils and appropriate for vegetation and program needs.

Note: This test must only be done in the field.

P7.3



Section 7: Construction

3. Soil chemical characteristics:

- Restore appropriate soil chemical characteristics for plant growth. The minimum basic profile that must be tested includes:
 - pH
 - Soluble salts (electrical conductivity)
 - Cation exchange capacity (CEC)
 - Extractable phosphorus
 - Potassium
 - Calcium
 - Magnesium
 - Sodium (in semi-arid and arid climates)
- The pH, cation exchange capacity, and nutrient profiles should be comparable to the original undisturbed soil or the site's reference soil and appropriate for vegetation and program needs. Salinity must be suitable for regionally appropriate plant species.

OR

Soil biological function:

- Ensure that soil biological function is restored in remediated soils. Soil biota assays are complex and vary regionally, making potentially mineralizable nitrogen serve as a proxy assessment of biological activity.

Required tests per project area:

Restored Vegetated Area	Minimum Number of Soil Tests Required
≤ 0.5 acre (0.20 hectares)	1 set for each soil restoration treatment zone type (see Soil+Veg P4.1)
> 0.5 acre (0.20 hectares) to ≤ 1 acre (0.40 hectares)	2 sets for each soil restoration treatment zone type
> 1 acre (0.40 hectares) to 2 acres (0.81 hectares)	3 sets for each soil restoration treatment zone type
> 2 acres (0.81 hectares) to ≤ 20 acres (8.09 hectares)	1 set per acre for each soil restoration treatment zone type
> 20 acres (8.09 hectares)	1 set per 3 acres for each soil restoration treatment zone type

Note: If multiple soil restoration treatment zones have the same soil restoration methods, treat them as one type.

Structural or engineered media:

These specialized media are exempt from meeting the soil restoration criteria above when used for applications such as the following. However, all other requirements must be met and documentation submitted accordingly:

- Athletic fields
- Green roofs
- Raingardens
- Vertical green walls
- Trees in paving
- Bioswales
- Green vehicle easements
- Steep slopes
- Food gardens
- Constructed wetlands

P7.3



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Note: Neither imported topsoils nor manufactured soil blends designed to serve as topsoil may be mined from the following locations (unless soils are a byproduct of a construction process):

- Greenfield sites
- Prime farmland, unique farmland, farmland of statewide importance or farmland of local importance, as defined by the U.S. Natural Resources Conservation Service (or local equivalent for projects outside the United States)

RECOMMENDED STRATEGIES

- Limit disturbance during construction to minimize the need for additional restoration. In areas that will be re-vegetated, restore soil characteristics necessary to support the selected vegetation types. Below are sample methods to restore soils:
 - Stockpiling and reusing existing site topsoils, incorporating organic amendments, if needed
 - Amending site soils in place with organic matter and mechanically correcting compaction if needed (e.g., by ripping or discing)
 - Importing a topsoil or soil blend designed to serve as topsoil, avoiding prime farmland sources or greenfield sites unless soils are a byproduct of a construction process
- When selecting a soil restoration strategy, consider the design, site use, and future site maintenance expectations. Consider the following possibilities:
 - Adding mature, stable compost to unscreened soil can be a sustainable strategy.
 - Many un-screened and un-amended soils will drain adequately.
 - Amend with other earth materials to modify a soil's gradation, texture, and organic matter content.
- Select organic materials for on-site amendment or for blending of imported soils from sources that are renewable within a 50-year cycle:
 - Mature, stable compost is recommended as the best source of organic matter, for its stability, biological activity, and soil structure building qualities. If mature, stable compost is not locally available, look for locally available organic residuals that can be composted on or off site to produce a mature composted organic amendment.
 - Involve a qualified horticultural or soil professional in selecting and balancing amendments for healthy plant growth.
- Guidelines for compost include these qualitative measurements:
 - Has a carbon to nitrogen ratio (C:N) below 25:1. Higher C:N ratios may be acceptable if specified by a qualified professional to be more appropriate for the type of vegetation to be established.
 - Does not exceed pollutant concentration limits established by the U.S. EPA in the 40 CFR Part 503 Biosolids Rule, section 503.13 table 3 "Pollutant Concentrations" (or local equivalent for projects outside the United States) or any applicable state or local regulations
 - Does not contain viable weed seeds or invasive plant propagules
 - Results in final soil conditions conducive to growing the type of vegetation to be established
- Before placing stockpiled or imported topsoils, consider scarifying any areas of construction-compacted subsoil, except where this process will damage existing tree roots. Ideally, the first lift of replaced soil is mixed into this scarification zone in order to improve the transition between the subsoil and overlying soil horizons.

P7.3



Section 7: Construction

- Most planting soil should be installed in 12-inch (30.48-centimeter) lifts at compaction between 78 to 85 percent of maximum dry density per the Standard Proctor Test. Understand that installed soil, even when correctly installed, will settle slightly after the completion of work. Set final grades slightly higher than the desired long-term grades (10 to 15 percent of the installed soil depth) to account for this settlement. Where there is a low tolerance for settlement or slope stability issues, use sandier soils and compact soil in eight-inch (20.32-centimeter) lifts to 80 to 84 percent maximum dry density per the Standard Proctor Test.
- Engineered growing media* (e.g., soils specified for green roofs, street trees, wetlands, environmental restoration sites) should meet the intent of this prerequisite, follow the requirements to the greatest extent practical, and follow current best available science and practical standards for the engineered growing media and application.

* *Note:* There is no current standard for engineered growing media, but if growing media are used on-site, the rough guidelines described here are recommended.

P7.3



Credit 7.4: Restore soils disturbed by previous development

3–5 points

INTENT

Support healthy plants, biological communities, water storage, and infiltration by restoring soils in areas disturbed by previous development.

REQUIREMENTS

Restore soils on site disturbed by previous development. These requirements apply only to previously disturbed areas that will be re-vegetated. Areas with soils that were previously developed and restored per requirements in *Construction P7.3: Restore soils disturbed construction* may also be included here.

To count towards this credit, restored soils must cover a minimum of 500 square feet (46.46 square meters) or five percent of the total project area. Credit point values are based on the surface area of soil disturbed by previous development that will be re-vegetated and the degree of disturbance of those soils (disturbed or severely disturbed). See Point Value Table 7.4-A below.

- Locate reference soils to guide and determine performance criteria that are appropriate for the site's vegetation, intended program, and site elements.
 - If identified reference soils are not appropriate for the design intent, explain why and describe the soil characteristics that will guide soil restoration treatment efforts. (See *Pre-Design P2.2: Conduct a pre-design site assessment* and *Soil+Veg P4.1: Create and communicate a soil management plan*.)
- Restore disturbed existing soils to a minimum depth of 12 inches (30.48 centimeters)
 - Where planting trees, restore soils to a greater depth and volume to support (biologically, structurally, hydrologically, and geotechnically) the intended mature tree canopy.
- Test restored (final) soil conditions to ensure the following soil restoration criteria are met (see *Construction P7.3: Restore soils disturbed during construction* for details):
 1. **Organic matter** (required)
 2. **Compaction** (field test or undisturbed core sample only)
OR
Infiltration (field test only)
 3. **Soil chemical characteristics**
OR
Soil biological function

C7.4



Section 7: Construction

Required tests per project area:

Restored Vegetated Area	Minimum Number of Soil Tests Required
≤ 0.5 acre (0.20 hectares)	1 set for each soil restoration treatment zone type (see Soil+Veg P4.1)
> 0.5 acre (0.20 hectares) to ≤ 1 acre (0.40 hectares)	2 sets for each soil restoration treatment zone type
> 1 acre (0.40 hectares) to 2 acres (0.81 hectares)	3 sets for each soil restoration treatment zone type
> 2 acres (0.81 hectares) to ≤ 20 acres (8.09 hectares)	1 set per acre for each soil restoration treatment zone type
> 20 acres (8.09 hectares)	1 set per 3 acres for each soil restoration treatment zone type

Note: If multiple soil restoration treatment zones have the same soil restoration methods, treat them as one type.

TABLE 7.4-A: Point Value Table

	Percent or total site area that will be re-vegetated		
	500 sq ft to 0.5 acres (46 square meters to 0.20 hectares) OR at least 5%	0.5 acres to 5 acres (0.20 to 2.02 hectares) OR 10% or more	More than 5 acres (2.02 hectares) OR 30% or more
Disturbed	3 points	3 points	4 points
Severely disturbed	3 points	4 points	5 points

Note: Soils must be reused for functions comparable to their original function (i.e., topsoil is used as topsoil, subsoil as subsoil, or subsoil is amended to become functional topsoil).

Structural or engineered media:

These specialized media are exempt from meeting the soil restoration criteria above when used for applications such as the following. However, all other requirements must be met and documentation submitted accordingly:

- Athletic fields
- Green roofs
- Raingardens
- Vertical green walls
- Trees in paving
- Bioswales
- Green vehicle easements
- Steep slopes
- Food gardens
- Constructed wetlands

C7.4



Section 7: Construction

Note: Imported topsoils, or manufactured soil blends designed to serve as topsoil, may not be mined from the following locations (unless soils are a byproduct of a construction process):

- Greenfield sites
- Prime farmland, unique farmland, farmland of statewide importance or farmland of local importance, as defined by the U.S. Natural Resources Conservation Service (or local equivalent for projects outside the United States)

RECOMMENDED STRATEGIES

Please see detailed recommended strategies for soil restoration in *Construction P7.3: Restore soils disturbed during construction*.

C7.4



Credit 7.5: Divert construction and demolition materials from disposal

3–4 points

INTENT

Support a net-zero waste site and minimize down-cycling of materials by diverting, reusing, or recycling construction and demolition materials to avoid disposal in landfills or combustion in incinerators.

REQUIREMENTS*

Percent calculations may be based on weight or volume (tons or cubic yards), but must be submitted consistently throughout. The requirements apply to non-hazardous construction and demolition materials.

Calculations in this credit exclude land-clearing materials generated during all phases of design and construction and structures and paving reused on site in their existing form.

- Develop and implement a construction waste management plan that, at a minimum, identifies the materials to be diverted from disposal and whether they will be sorted on site or comingled.
- Divert materials from disposal by recycling, salvaging or reusing structural materials (e.g. bricks, steel, wood), and road and infrastructure materials (e.g., pavement, drainage structures) for at least:
 - 50 percent of structural materials and 95 percent of road and infrastructure materials **3 points**
 - 75 percent of structural materials and 95 percent of road and infrastructure materials **4 points**

RECOMMENDED STRATEGIES

- Inventory existing materials on site and use the results to establish project goals for salvaged materials.
- Reuse existing materials on site or recycle them for on-site use when possible.
- Develop a construction waste management plan to specify and communicate the expectations and requirements of the project.
- If materials are to be reused as soil amendments (e.g., gypsum, lime), soils tests should be conducted first to determine that the material is appropriate for use with the site soils.
 - Non-composted and non-organic materials should not be added to soil as an amendment unless these materials can be demonstrated to benefit site soils and planned vegetation.

C7.5



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:
- LEED BD+C v2009 MR Credit 2: Construction waste management
- LEED BD+C v4 MR Credit 5: Construction and demolition waste management

Credit 7.6: Divert reusable vegetation, rocks, and soil from disposal

3–4 points

INTENT

Support a net-zero waste site by diverting from disposal vegetation, mineral and rock waste, and soils generated during construction.

REQUIREMENTS

The requirements apply to all on-site plant material, mineral and rock waste, and soils generated during the land-clearing activities of the site during all phases of design and construction.

Contaminated soils and diseased or invasive plant materials should not be included in calculations of land-clearing materials totals. Salvaging plants is a technique that can be used to meet the requirements of this credit.

Soils must be reused for functions comparable to their original function (i.e., topsoil is used as topsoil, subsoil as subsoil, or subsoil amended to become functional topsoil).

- Retain 100 percent of land-clearing materials:
 - For use within 50 miles (80.47 kilometers) of the site **3 points**
 - On site **4 points**

RECOMMENDED STRATEGIES

- Inventory salvageable plants existing on the site and use the results to establish project goals for salvaged vegetation, rocks, and soils.
- Use existing vegetation, mineral and rock materials, and soils as resources in site design.
- Recycle excess vegetation generated during land-clearing to produce compost, mulch, erosion-protection measures, or other site amenities.
- Where possible, balance cut and fill volumes, and reuse existing soils and rocks in the proposed site design instead of specifying and importing new materials for the project
- Manage and prevent spread of diseased and invasive plant materials found on site using methods such as hot composting.
- Divert reusable vegetation, rocks, and soils that exceed the amount that can be used on site to local outlets such as soil blenders and mulch and compost producers.

C7.6



Credit 7.7: Protect air quality during construction

2–4 points

INTENT

Protect air quality and reduce pollution by using construction equipment that reduces emissions of localized air pollutants and greenhouse gasses.

REQUIREMENTS

These requirements apply to all diesel engines used on site during construction. Delivery vehicles are not covered in this credit; exclude them from calculations.

- Establish a policy to reduce diesel emissions from idling construction equipment. Limit unnecessary idling to no more than five minutes in any 60-minute period.
- Implement a preventative maintenance plan for all equipment according to engine manufacturer specifications.
- Use ultra-low sulfur diesel fuel that meets American Society of Testing and Materials (ASTM) specifications with sulfur less than or equal to 15 ppm for all non-road diesel equipment.
- Use no construction equipment with Tier 0 engines.
- 50 percent of the total run-time hours of construction equipment meets one of the following criteria:
 - Tier 2 or higher engines **2 points**
 - Tier 3 or higher engines **3 points**
 - Tier 4 or higher engines **4 points**

RECOMMENDED STRATEGIES

- Select construction contractors who are committed to reducing diesel emissions from construction equipment and vehicles.
- Reduce construction emissions by reducing idling; enhancing maintenance practices; using cleaner fuels; retrofitting engines with technologies designed to reduce emissions; and replacing older equipment with newer, cleaner engines and equipment.
- Use GPS devices to provide data that track machinery's run time and idle time.

C7.7





SECTION 8

OPERATIONS + MAINTENANCE

PREREQUISITE / CREDIT	TITLE	POINTS
O+M P8.1	Plan for sustainable site maintenance	Required
O+M P8.2	Provide for storage and collection of recyclables	Required
O+M C8.3	Recycle organic matter	3-5 points
O+M C8.4	Minimize pesticide and fertilizer use	4-5 points
O+M C8.5	Reduce outdoor energy consumption	2-4 points
O+M C8.6	Use renewable sources for landscape electricity needs	3-4 points
O+M C8.7	Protect air quality during landscape maintenance	2-4 points

Prerequisite 8.1: Plan for sustainable site maintenance

Required

INTENT

Ensure long-term site sustainability by developing a site maintenance plan outlining the project's strategies and required implementation tasks.

REQUIREMENTS

- With the integrated design team (see *Pre-Design P2.1: Use an integrative design process*), prepare a site maintenance plan according to the outline below.
- Explain the short-term tasks and the long-term strategic plan (i.e., 10-year desired outcome) to achieve sustainable maintenance goals.
- Ensure the maintenance contractor or site manager commits to educating maintenance personnel on the goals and implementation of the site maintenance plan.

Note: For additional information and resources regarding the following maintenance topics, see the associated prerequisites and credits listed in the right-hand column of the outline.

Topic	Description	Prerequisite or Credit #
1. Water	Stormwater features and BMPs effectiveness <ul style="list-style-type: none"> • Proper maintenance activities (including anticipated maintenance schedule) used to ensure continued effectiveness of stormwater features and BMPs (e.g., replacement of vegetation, removal of accumulated sediment load) 	P3.1, C3.3, C3.5
	Water treatment <ul style="list-style-type: none"> • Process used for treating any water features (e.g., avoid chlorine, bromine) 	C3.3, C3.4, C3.5
	Water quality <ul style="list-style-type: none"> • Appropriate maintenance activities designed to reduce: <ul style="list-style-type: none"> - Exposure to pollutants - Mobilization and transport of pollutants in runoff 	C3.3, C3.4, C3.5, C3.6
	Irrigation allotment and schedule <ul style="list-style-type: none"> • Anticipated watering schedule (frequency and duration) that allows the site to meet annual volume requirements and restrictions 	P3.2, C3.4
	Irrigation water source <ul style="list-style-type: none"> • Process used for maintaining non-potable irrigation water sources (e.g., rainwater harvesting, graywater systems) 	P3.2, C3.4
	Temporary irrigation <ul style="list-style-type: none"> • Process used for disconnecting or removing any temporary irrigation systems after the plant establishment period 	C3.4

P8.1



continued

Section 8: Operations + Maintenance

Topic	Description	Prerequisite or Credit #
2. Soil stewardship	Soil amendments <ul style="list-style-type: none"> Process used for identifying soil deficiencies, including conducting soils tests prior to adding amendments <ul style="list-style-type: none"> Specify use of least harmful amendments (such as compost) when necessary. 	P4.1, C6.7, P7.3, C7.4, C8.4
	Use of fertilizers <ul style="list-style-type: none"> Process used for applying fertilizers (only if needed) to ensure that application is effective and prevents harm to environmental and human health 	P4.1, P4.3, C6.7, C8.4
	Erosion and compaction <ul style="list-style-type: none"> Process used for alleviating soil erosion or compaction (due to site use or maintenance) that is detrimental to plant health 	P4.1, P7.3, C7.4
3. A. Vegetation (Plant stewardship)	Plant health care (PHC) <ul style="list-style-type: none"> Process used for maintaining vegetation according to long-term plans for the site, including food producing gardens Recognized standards of professional horticultural practices used Process used for monitoring plant health to prevent problems List of potential appropriate, noninvasive plants to be used for plant replacement <ul style="list-style-type: none"> When replacing plants, consider maintenance needs and design consistency. 	C3.5, C3.6, P4.3, C4.4, C4.5, C4.6, C4.7, C4.8, C4.9, C4.10, C4.11, C6.7, C8.3, C8.4
	Healthy plant material management <ul style="list-style-type: none"> Process used for managing excess organic plant material generated on site (e.g., composting, recycling) Plan and schedule for harvest of food producing gardens 	C6.7, C8.3, C8.4
	Diseased and invasive plant material disposal <ul style="list-style-type: none"> Process used for disposing of organic plant materials generated on site that are not suitable for composting or recycling (i.e., dead diseased, invasive, or pest-infested vegetation) in a manner that does not increase the likelihood of spread. 	P4.2, C7.6, C8.3
	Site Safety <ul style="list-style-type: none"> Process used for maintaining vegetation to ensure site safety and that meets the intended uses of the site Prevention of wildfire Process used for managing vegetative biomass to reduce risk of catastrophic wildfire <ul style="list-style-type: none"> If prescribed fires are to be used, describe burn plan that is similar in technique, frequencies, and intensities to natural fire regimes in the ecosystem. 	C4.11, C8.3, C8.4
	Pest management <ul style="list-style-type: none"> Integrated pest management (IPM) techniques used to control pests, diseases, and any unwanted species of plants and animals on site 	P4.2, C6.7, C8.4

P8.1



Section 8: Operations + Maintenance

Topic	Description	Prerequisite or Credit #
3. B. Vegetation (Invasive species management)	Invasive species list <ul style="list-style-type: none"> List of invasive plant species identified in the area according to: <ul style="list-style-type: none"> Regional lists (when listing occurs through a vetted, transparent process and has been accepted by the regional stakeholders) State Noxious Weed laws Federal Noxious Weed laws 	P4.2
	Invasive management plan <ul style="list-style-type: none"> Active multi-year plan for control and subsequent management of any plant species included above, including: <ul style="list-style-type: none"> IPM strategies Procedure for identifying and monitoring for additional invasive species that may colonize the site Procedure for adding new species as they are recognized by local authorities Initial treatment, follow-up treatments, and long-term control including monitoring Methods to dispose of invasive plant materials 	P4.2, C8.4
4. Materials management	Materials replacement <ul style="list-style-type: none"> List of preferred characteristics for replacement materials (e.g., materials from local and regional sources, recycled content materials, certified wood, energy-efficient lighting) 	P5.1, C5.4, C5.5, C5.6, C5.7, C5.8, C5.9, C5.10, C6.8, C8.5
	Functionality and extended use <ul style="list-style-type: none"> Process used for repairing and maintaining structures and paving in a way that reduces harm to environmental and human health and ensures the effectiveness of the material (e.g., clean permeable surfaces, low-emitting sealants) Process used for maintaining structures and paving to ensure site safety and that meets the needs of the intended uses of the site 	C4.9, C5.2, C5.3, C5.4, C5.8
	Site safety <ul style="list-style-type: none"> Process used for repairing and maintaining structures and paving that reduces harm to environmental and human health and ensures the effectiveness of the material (e.g., clean permeable surfaces, low-emitting sealants) Process used for maintaining structures and paving to ensure site safety and that meets the needs of the intended uses of the site Process used for properly disposing of harmful materials 	C5.2, C6.2, P8.2, C8.3, C8.4
	Historic buildings, structures, objects, and cultural landscapes <ul style="list-style-type: none"> Process for maintaining the integrity of historic buildings, structures, and cultural landscapes, including: <ul style="list-style-type: none"> Detailed specifications related to the repair or replacement of features and any maintenance work to be documented for records Process for determining how conflicts between historic and environmental concerns will be addressed 	C4.5, C5.2, C6.1

continued

P8.1



Section 8: Operations + Maintenance

Topic	Description	Prerequisite or Credit #
4. Materials management <i>(continued)</i>	Recyclable materials <ul style="list-style-type: none"> Process used for managing and recycling all paper, glass, plastics, and metals generated on site 	P8.2
	On-site food waste <ul style="list-style-type: none"> Process used for on-site collection of compostable organics to prevent them from entering the municipal solid-waste stream 	C6.7, C8.3
5. Sensitive site features	Conserve aquatic ecosystems <ul style="list-style-type: none"> Maintenance and monitoring techniques that will ensure proper aquatic ecosystem function 	P1.2, P1.3, C3.5, C3.6
	Conserve habitats for threatened and endangered species <ul style="list-style-type: none"> Process used for avoiding impacts during site maintenance to threatened or endangered species and their habitats 	P1.4, C4.7
	Maintain <u>Vegetation and Soil Protection Zones (VSPZs)</u> <ul style="list-style-type: none"> Ongoing management activities to protect the integrity of VSPZs 	P1.1, P1.2, P1.3, P1.4, P2.3, P4.1, C4.4, C4.5, C4.6, C4.7
6. Landscape maintenance equipment	Equipment maintenance <ul style="list-style-type: none"> Types of equipment (i.e., manual, electric, low-emitting, or gasoline powered) to be used on site Process used for maintaining equipment Process used for cleaning equipment to remove invasive species to prevent transport to other sites 	P4.2, C8.7
	Site user experience <ul style="list-style-type: none"> Maintenance schedule that minimizes users' exposure to noise, localized air pollution, and other disturbances 	C6.4, C8.4, C8.7
7. Snow and ice	Managing snow and ice <ul style="list-style-type: none"> Process (including stockpiling) used for managing snow and ice in ways that limit degradation of water quality and surrounding plants and soil health Process used for stockpiling areas and managing any snow-melt that will be used as a water source on site 	P1.2, P1.3, P1.4, P3.1, C3.3, C3.5, C3.6, C6.2
8. Adaptive Management	Update site maintenance plan <ul style="list-style-type: none"> Process used for reevaluating the maintenance plan on an annual basis and revising as needed to adapt to future conditions and unforeseen changes 	
9. Other Maintenance-Related Topics		

P8.1



Prerequisite 8.2: Provide for storage and collection of recyclables

Required

INTENT

Facilitate recycling and reduce waste generation and disposal in landfills by providing space for recyclable materials collection in outdoor areas.

REQUIREMENTS*

- Conduct a waste stream study to estimate the amount of recyclable materials generated in outdoor areas, including:
 - Paper
 - Glass
 - Plastics
 - Metals
- Co-locate collection containers for recyclables next to all trash receptacles
- Ensure that service is provided for collection of recyclable materials, or advocate for implementation of a local recycling program.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes the processes for collecting recyclable materials on site.

RECOMMENDED STRATEGIES

- Coordinate the size and function of the recycling areas with the anticipated collection services for glass, plastics, paper, and metals to maximize the effectiveness of the dedicated areas.

P8.2



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:
- LEED BD+C v2009 *MR Prerequisite 1: Storage and collection of recyclables*
- LEED BD+C v4 *MR Prerequisite 1: Storage and collection of recyclables*

Credit 8.3: Recycle organic matter

3–5 points

INTENT

Support nutrient cycling, improve soil health, and reduce transportation costs and materials going to landfills by recycling vegetation trimmings or food waste to generate compost and mulch.

REQUIREMENTS

- Conduct a waste stream study to estimate the amount of vegetation trimmings and food waste, if applicable, that will be generated.
- Compost and/or recycle:
 - 100 percent of vegetation trimmings off site within 50 miles (80.47 kilometers) **3 points**
 - 100 percent of vegetation trimmings on site **4 points**
 - 100 percent of vegetation trimmings AND compostable food waste on site **5 points**
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and demonstrates anticipated strategies for composting or recycling any vegetation trimmings and food waste.

RECOMMENDED STRATEGIES

- Collect excess vegetation generated during site maintenance to divert to a composting facility on or off site.
- Consider using a mulching mower when trimming grass and leaving plant materials in situ.
- Sites with limited space for composting can utilize neighborhood facilities and programs to process organic matter.
- If generating food waste, capitalize on the results of waste stream study to determine source reduction opportunities (e.g., alter purchasing practices, join food donation programs).

C8.3



Credit 8.4: Minimize pesticide and fertilizer use

4–5 points

INTENT

Reduce stress on plants, decrease negative effects on human health, and have the lowest possible negative ecological and environmental impacts by promoting practices based on observation and planning to minimize or eliminate synthetic pesticide and fertilizer use.

REQUIREMENTS

- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and provides non-toxic maintenance measures for ecologically sensitive areas (e.g., streams, drains, surface waters, wetlands, wells, groundwater, grassed waterways, existing buffers, areas sensitive to erosion, sensitive wildlife habitat) and human use areas (e.g., areas for children and pets, food production areas) that exist within or in proximity to the SITES project boundary.

Option 1: Plant health care plan

4 points

Include all of the following policies and practices and adapt them to the specific plants, pests, ecologically sensitive areas, and human use areas on site.

Pesticides and Fertilizers

- Ban all “weed and feed” type fertilizers.
- Set and enforce buffer zones where fertilizers and pesticides may not be applied.
 - Buffer zones should be applied around areas such as:
 - > Water bodies, wetlands, and other aquatic ecosystems
 - > Drains, conveyance features, and areas where runoff can directly impact water quality (e.g., near curbs and on sidewalks and driveways)
 - > Human use areas (e.g., playgrounds, seating areas, places of respite, food production areas)
 - Minimum buffer zones should be set at 10 feet (3.05 meters) but may need to be larger depending on local regulations and conditions (e.g., slope, habitat)
- Develop written safety requirements for proper storage, mixing, labeling, transporting, application, and disposal of fertilizers, pesticides, leftover mixtures, and containers. Refer to appropriate local, state, and federal regulations.
- Outline procedures and list contacts for handling accidental spills of pesticides and fertilizers.
- Require detailed record keeping for the application of any fertilizers or pesticides, including substance used, concentration, total volume applied, area treated, target species, weather, and environmental conditions.
- Communicate policies to all facilities operators, maintenance contractors, and other relevant parties.

C8.4



Section 8: Operations + Maintenance

Pesticides

- Establish action thresholds that define pest population levels and approved management strategies that may be used to reduce them. Physical and mechanical controls should be implemented first, then biotic controls; targeted chemical controls should be a last resort.
- Require prior notification to all site users and to the public when chemical pesticides will be applied. Define how and when communication will be given (e.g., size, location, and number of posted signs; office memo).
- Specify the use of third-party certified (e.g., EcoWise, Greenshield, or equivalent) integrated pest management (IPM) service providers, when pest control services are contracted out.

Fertilizers

- Outline the need for the use of fertilizers.
- Require soil or plant tissue testing in order to determine the type and amount of fertilizer needed.
- Define thresholds and set levels for fertilizer concentrations and frequency of application according to testing results.
- Define how much water should be applied after fertilizer applications. Explain the choices made by referring to regional climatic conditions, soil data (e.g., type, texture, composition) and fertilizer concentrations.
- Specify the use of service providers that have current certifications in fertilizer best management practice (in cities or states where certification is offered) when fertilization services are contracted.

Option 2: Best management practices for plant health care

5 points

Fulfill all requirements for Option 1 and incorporate four of the seven additional policy options listed below:

Pesticides and Fertilizers

1. Incorporate vegetative and grading components into the site design that help mitigate the spread or migration of pesticides and fertilizers in the landscape (e.g. buffer zones, vegetative filter strips, berms, swales).

Pesticides

2. Ban the use of all pesticides for cosmetic purposes.
3. Ban the use of all pre-emergent herbicides.
4. Create a list of herbicides, insecticides, and fungicides approved for use when physical, mechanical, and biotic control methods for pests have been ineffective. Specify chemicals that are the least toxic (i.e., biodegrade quickly and do not threaten human health, water quality, ground water, or aquatic species).

Fertilizers

5. Develop a list of organic or slow-release fertilizer products that are approved for use on the site.
6. Ban the application of all fertilizers during rainy seasons, before predicted heavy rainfall events, and during summer months.
7. Ban the use of all fertilizers after the establishment period, except for periodic applications of mature stable compost or other soil amendments as indicated by soil or plant tissue tests.

C8.4



Section 8: Operations + Maintenance

RECOMMENDED STRATEGIES

- Use appropriate plant species.
- During the planning and design stage, incorporate a variety of plant types in the landscape to avoid planting too many of one species. Low species diversity can create problems such as pest outbreaks.
- If using plants susceptible to pest infestation, learn to identify pest life stages. Incorporate this information into the monitoring schedule.
- Use practices that rely on observation and planning (e.g., IPM) to reduce synthetic inputs that may have short and long-term deleterious impacts on human health and the environment.
- Comply with any local, state, and federal regulations or ordinances (e.g., groundwater protection zones) that govern applications of fertilizers and pesticides.

C8.4



Credit 8.5: Reduce outdoor energy consumption

2–4 points

INTENT

Reduce greenhouse gas emissions by minimizing energy consumption and costs associated with site use and operations.

REQUIREMENTS

- Select outdoor lighting and other site equipment (e.g., aerators, ceiling fans, water pumps, transformers) to achieve an annual energy reduction from the estimated base-line energy use for at least:
 - 30 percent reduction from baseline energy use for those products **2 points**
 - 60 percent reduction from baseline energy use for those products **3 points**
 - 90 percent reduction from baseline energy use for those products **4 points**
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and includes details for repair and replacement materials (e.g., energy-efficient lighting).

Note: The baseline energy use is calculated using that of the lowest-cost comparable item.

RECOMMENDED STRATEGIES

- Research various alternatives for each type of outdoor appliance to be installed on the project, in order to identify those options that are most energy efficient.
- When possible, look for solar-powered alternatives to conventional products.

C8.5



Credit 8.6: Use renewable sources for landscape electricity needs

3–4 points

INTENT

Reduce greenhouse gas emissions associated with site operations and minimize air pollution, habitat destruction, and pollution from fossil fuel-based energy production by supporting a renewable energy market.

REQUIREMENTS*

Option 1: On-site renewable production

- Use on-site renewable energy sources to generate outdoor site electricity for at least:
 - 50 percent of annual outdoor site electricity **3 points**
 - 100 percent of annual outdoor site electricity **4 points**
- Calculate the electricity generated by quantity (e.g., kilowatts), not cost.

The use of a community renewable energy system, such as a solar garden, is allowed if the following requirements are met:

- Actual ownership in the system or a signed lease agreement for a period of at least 15 years
- The system is located within the same utility service area as the facility claiming the use

The percentage of credit will be determined as a percentage of ownership or percent utilization assigned in the lease agreement, or other written and signed document, as it applies to the project's total annual outdoor site electricity use.

Option 2: Green power

- Engage in a contract for the delivery of green power or offsets from qualified resources that have come online since January 1, 2005. Contracts should be for a minimum of five years to be delivered at least annually. The contract must specify the quantity, not the cost, of the project's energy that comes from green power, carbon offsets, or renewable energy certificates (RECs).
 - 50 percent of annual outdoor site electricity **3 points**
 - 100 percent of annual outdoor site electricity **4 points**

Note: Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide-equivalent basis. They must be certified by Green-e Climate or an equivalent program.

C8.6



* Components of this credit were adapted from the U.S. Green Building Council's LEED credits:

- LEED BD+C v2009 EA Credit 2: On-site renewable energy
- LEED BD+C v2009 EA Credit 6: Green power
- LEED BD+C v4 EA Credit 5: Renewable energy production
- LEED BD+C v4: EA Credit 7: Green power and carbon offsets

Section 8: Operations + Maintenance

Green power and RECs must be certified by Green-e Energy certified or an equivalent program. RECs can only be used to mitigate the effects of Scope 2.

For U.S. projects, the offsets must be from greenhouse gas emissions reduction projects within the United States.

RECOMMENDED STRATEGIES

- Assess the project for non-polluting and renewable energy potential, including solar, wind, geothermal, and low-impact hydropower.
- Determine the energy needs of the site, and investigate opportunities to engage in a green-power contract.

C8.6



Credit 8.7: Protect air quality during landscape maintenance

2–4 points

INTENT

Protect air quality and reduce pollution by minimizing the use of powered landscape maintenance equipment that exposes site users to localized air pollutants and generates greenhouse gasses.

REQUIREMENTS

These requirements apply to all powered equipment used for landscape maintenance on site. Sites that require no powered maintenance equipment are eligible for this credit.

Option 1: Scheduled maintenance

2 points

- Plan for the use of powered maintenance equipment only during hours when the site is closed for use or during periods when the lowest percentage of site users are potentially exposed to landscape maintenance emissions
- For sites with constant use (e.g., college and university settings), designate times for powered maintenance equipment use to occur when the number of site users is typically at its lowest.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete. It must describe how the use of powered maintenance equipment will be limited to hours when the site is closed for use or during periods when the lowest percentage of site users are present.

Option 2: Low-emitting equipment

3 points

- Specify a 50 percent reduction in hydrocarbon (HC) and nitrogen oxide (NOx) emissions and a 75 percent reduction in carbon monoxide (CO) emissions from baseline conditions.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and specifies equipment allowed for use on site.

Option 3: Manual or electric powered maintenance equipment

4 points

- Use only manual and/or electric-powered maintenance equipment.
- Ensure the section of the site maintenance plan (see *O+M P8.1: Plan for sustainable site maintenance*) is complete and specifies equipment allowed for use on site.

RECOMMENDED STRATEGIES

- Design the site to minimize requirements for gasoline-powered maintenance equipment.
- Select plants that require minimal maintenance or can be maintained with hand tools.
- Select equipment that minimizes emissions of air pollutants and meets or exceeds U.S. EPA standards (or local equivalent for projects outside the United States). Focus on reducing the use of 2-stroke engine equipment (e.g., line trimmers, blowers).
- Convert turf areas to ground cover or shrubs in areas that adjoin walks and curbs. Large lawn areas can be converted to meadows or naturalized into restored habitats.

C8.7





SECTION 9

EDUCATION + PERFORMANCE MONITORING

PREREQUISITE / CREDIT	TITLE	POINTS
Education C9.1	Promote sustainability awareness and education	3-4 points
Education C9.2	Develop and communicate a case study	3 points
Education C9.3	Plan to monitor and report site performance	4 points

Credit 9.1:

Promote sustainability awareness and education

3–4 points

INTENT

Promote understanding of sustainability in ways that positively influence user behavior by interpreting on-site features and processes.

REQUIREMENTS

Educational content and elements must relate to SITES prerequisites or the credits a project is pursuing.

Option 1: Educational and interpretive elements

3 points

- Provide a minimum of three educational or interpretive elements that draw attention to and explain sustainable features or processes of the site design, construction, operations, or maintenance. Demonstrate how the educational elements represent environmentally responsible behavior.

Option 2: Additional education

4 points

Complete Option 1 and one of the following:

- **Interactive educational or interpretive elements**
 - Design a minimum of 30 percent of educational elements on site to be interactive.
- **Programming**
 - Provide programming that welcomes, encourages, and expands sustainability learning and understanding on the site.
- **Partnerships**
 - Create partnerships to extend sustainability education to local community groups.

C9.1



Section 9: Education + Performance Monitoring

RECOMMENDED STRATEGIES

- Follow these guidelines for educational or interpretive elements:
 - Deliver one focused message.
 - Make educational messages compelling.
 - Use visual illustrations to convey the educational message.
- Design educational and interpretive elements with potential audiences in mind.
- Provide information in a variety of formats (e.g., maps, models, brochures, electronic kiosks, MP3-based or cell phone tours).
- Use natural elements provided to improve environmental conditions and include opportunity for user education and understanding. For example, raingardens for stormwater management can be designed to provide a restorative setting, or a roof garden can serve as a break room.
- Identify those sustainability features that can be easily applied to off-site situations and design interpretative elements based on these applications.
- Tie programming to state standards and local school district goals and learning initiatives.
- Consider including interpretative descriptions in multiple languages to meet a broader audience based on visitor and population demographics.
- Incorporate interactive elements that encourage site users and visitors to integrate understanding of on-site examples of sustainability practices with experiences and behaviors that extend beyond the site. Signage is not considered interactive.
- Design activities and programs to welcome diverse participants.

C9.1



Credit 9.2: Develop and communicate a case study

3 points

INTENT

Inspire and educate the public on the value of sustainable landscapes by describing and communicating a thoughtful and informative summary of the SITES project.

REQUIREMENTS

- Use the SITES project to clearly and effectively illustrate the approaches, strategies, and benefits of implementing sustainability at the site scale. Work with the project's integrated design team to develop a case study that, at a minimum, addresses the following criteria:
 - Project details (e.g., name, size, project type, former land use, terrestrial biome, budget for landscape and site portion only)
 - Project summary
 - Project team
 - Site context (i.e., location, climate, pre-design site constraints and opportunities)
 - Challenges and solutions
 - Sustainable features
 - Environmental, social, and economic performance benefits
 - Cost comparison of sustainable vs. conventional strategies
 - Lessons learned
 - Maintenance and monitoring (i.e., description of how the project promotes long-term sustainability)
- Share the completed case study and project images with the public in at least two locations by making them available to the Sustainable Sites Initiative™ and other related organizations and conferences for the purposes of increasing the knowledge base on site sustainability.

RECOMMENDED STRATEGIES

- Capture many “before” photos of the site prior to construction in addition to “after” (completed) photos.
- Communicate the case study needs to the entire team early in the design process.
- Provide guidelines for setting sustainability principles and performance goals.
- Develop and communicate methodologies that help to define performance benefits (economic, social, and environmental). Consult with related disciplines to identify the most appropriate metrics.
- Derive quantifiable benefits from tools such as monitoring data, post-occupancy evaluations, and design calculations.
- Describe limitations and lessons learned to advance the knowledge base of site sustainability.

C9.2



Credit 9.3: Plan to monitor and report site performance

4 points

INTENT

Improve the body of knowledge on long-term site sustainability by monitoring and documenting sustainable design practices to evaluate their performance over time.

REQUIREMENTS

- Develop a plan or policy to demonstrate ongoing performance monitoring and reporting of at least three SITES prerequisites or credits included below.
 - Monitoring must be done by a third party or qualified person on the design team for independent peer review.
 - Achievement is based having a monitoring plan or policy in place to report the performance monitoring evaluation; negative findings will not affect achievement of this or other prerequisites or credits.
- Provide proof of initial start-up funding (25 percent of total funding requirements) and staffing needs to begin the monitoring. Provide a plan for raising funds for the entire monitoring timeline as stated in the plan or policy.
- Develop three separate summary reports, including one for each of the prerequisites or credits that include the following components:
 - Describe the site feature or program that was implemented for the selected prerequisite or credit, and define the performance or outcome that is being evaluated.
 - Describe the methodology used to assess performance (i.e., sampling, measures or instruments, frequency, procedures).
 - Describe the corrective action to be taken if the design does not perform as intended.
- Develop a plan to increase the body of knowledge on long-term site sustainability by widely communicating the results in a discipline-wide professional magazine (e.g., *Planning*, *Landscape Architecture Magazine*), peer-reviewed scientific journal, professional national or international conference, or national or international public database (e.g., Landscape Architecture Foundation's "Landscape Performance Series").

Note: A separate summary report is not necessary if monitoring results are submitted to the U.S. National Stormwater BMP Database (or local equivalent for projects outside the United States).

C9.3



Section 9: Education + Performance Monitoring

Eligible Prerequisites / Credits for Performance Monitoring*

Water P3.1: Manage precipitation on site

Water P3.2: Reduce water use for landscape irrigation

Water C3.3: Manage precipitation beyond baseline

Water C3.4: Reduce outdoor water use

Water C3.6: Restore aquatic ecosystems

Soil+Veg P4.2: Control and manage invasive plants

Soil+Veg C4.7: Conserve and restore native plant communities

HHWB C6.2: Provide optimum site accessibility, safety, and wayfinding

HHWB C6.4: Support mental restoration

HHWB C6.5: Support physical activity

HHWB C6.6: Support social connection

Construction P7.3: Restore soils disturbed by construction

Construction C7.4: Restore soils disturbed by previous development

Education C9.1: Promote sustainability awareness and education

**Note:* If a project seeks to monitor SITES prerequisites or credits not listed in Table 9.3-A, a proposal must be made to SITES outlining any planned monitoring requirements and a timeframe.

RECOMMENDED STRATEGIES

- Communicate early in the design process that monitoring is a goal of the project.
- Set aside additional funding to ensure that monitoring will be conducted.
- Research peer-reviewed journals and professional magazines to understand requirements for submission and associated time frames.

C9.3





SECTION 10

INNOVATION OR EXEMPLARY PERFORMANCE

PREREQUISITE / CREDIT	TITLE	POINTS
Innovation C10.1	Innovation or exemplary performance (bonus points)	3-9 points

Credit 10.1: Innovation or exemplary performance

3–9 bonus points

INTENT

Encourage and reward innovation and exemplary performance in site design, construction, and maintenance by providing examples and performance criteria outside the current SITES v2 Rating System.

REQUIREMENTS

This credit allows for up to three innovations or exemplary performance achievements (9 points total) for projects that successfully complete the following steps:

Option 1: Exemplary performance

3 points

- Achieve significant, measurable exemplary performance above requirements outlined in the SITES v2 Rating System. An exemplary performance point is typically earned for achieving double the credit requirements or achieving the next incremental percentage threshold of an existing credit in SITES.

Option 2: Innovation outside the SITES v2 Rating System

3 points

- Apply and document innovative site practices and performance benefits in areas not specifically addressed by the SITES v2 Rating System.
 - Develop a new credit based on the proposed innovations including the following components:
 - > Intent
 - > Requirement for compliance
 - > Submittal documentation to demonstrate compliance
 - > An approach or strategy that might be used to meet the requirements
 - > Relevant resources and associated benefits

RECOMMENDED STRATEGIES

- Substantially exceed a SITES performance credit that addresses water, soils, vegetation, materials selection, or human health and well-being.
- Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environmental or human health benefits.
- Consider how the performance of a particular set of strategies can greatly exceed the intent of two or more credits in combination.

C10.1



Glossary

A **basic service** includes, but is not limited to: a bank, child-care facility (licensed), community or civic center, convenience store, farmers' market, food store with produce, hair care establishment, hardware store, health club or recreation facility, laundromat or /dry cleaner, library, medical or dental office, museum, park, stand-alone pharmacy, place of worship, police or fire station, post office, restaurant, school, senior-care facility, social services center, supermarket, and theater.
C1.6, P2.2

Biomass density index (BDI) is the density of plant layers covering the ground. It is calculated by summing the existing or proposed biomass value as a proportion of total site area (not including water or invasive species) for all on-site structural vegetation types.
C4.8

A **reference soil** falls into at least one of the following categories:

- Soils native to a site as described in Natural Resources Conservation Service Soil Surveys (refer to soils within the region if the site soils are not mapped or labeled as Urban Land Complex, Urban Fill, etc.)
- For sites that have no undisturbed native soils, use undisturbed native soils within the site's region that have native vegetation, topography, and soil textures similar to the site.
- For sites that have no existing soil, use undisturbed native soils within the site's region that support appropriate native plants or appropriate plant species similar to those intended for the new site.

P2.2, P4.1, P7.3, C7.4

A **soil restoration treatment zone** is any area of the site that is not protected in a Vegetation and Soil Protection Zone (VSPZ); not covered at project's end by buildings or pavement; and is re-vegetated as part of the project. Soil restoration treatment zones must be shown on the soil management plan (*Soil+Veg P4.1: Create and communicate a soil management plan*) and must be restored as required by *Construction P7.3: Restore soils disturbed during construction*.
P4.1, P7.3, C7.4

Solar reflectance (SR) is the fraction of solar energy that is reflected by a surface on a scale of 0 to 1. Black paint has a solar reflectance of 0; white paint (titanium dioxide) has a solar reflectance of 1. The standard technique for its determination uses spectrophotometric measurements, with an integrating sphere to determine the reflectance at each wavelength. The average reflectance is then determined by an averaging process, using a standard solar spectrum, as documented by ASTM Standards E903 and E892. (LEED v4.)

C4.9

Solar reflectance index (SRI) is a measure of a material's ability to reject solar heat, as shown by a small temperature rise. Standard black (reflectance 0.05, emittance 0.90) is 0 and standard white (reflectance 0.80, emittance 0.90) is 100. For example, a standard black surface has a temperature rise of 90°F (50°C) in full sun, and a standard white surface has a temperature rise of 14.6°F (8.1°C). Once the maximum temperature rise of a given material has been computed, the SRI can be calculated by interpolating between the values for white and black. Materials with the highest SRI values are the coolest choices for paving. Because of the way SRI is defined, particularly hot materials can take slightly negative values, and particularly cool materials can exceed 100. (LEED v4.)

C4.9

Vegetation and Soil Protection Zones (VSPZs) are areas identified during the pre-design phase that will be protected from all disturbances throughout the construction process to prevent damage to vegetation, soil structure, and function. *Pre-design P2.3 Designate and communicate Vegetation and Soil Protection Zones (VSPZs)* describes the requirements for VSPZs.
P1.1, P1.2, P1.3, P1.4, P2.3, P4.1, P4.2, C4.4, C4.5, C4.6, C4.7, P7.2, P8.1

Acknowledgments

EXECUTIVE COMMITTEE

Susan Rieff
Executive Director
Lady Bird Johnson Wildflower Center
The University of Texas at Austin

Holly Shimizu
Executive Director
United States Botanic Garden

Nancy C. Somerville, Hon. ASLA
Executive Vice President / CEO
American Society of Landscape Architects

Fritz Steiner, Ph.D., FASLA
Dean, School of Architecture
Center for Sustainable Development
The University of Texas at Austin

TECHNICAL CORE COMMITTEE

José Almiñana, FASLA, LEED AP
Principal
Andropogon Associates, Ltd.

Nina Bassuk, Ph.D.
Professor and Program Leader
Urban Horticulture Institute, Cornell University

Steve Benz, P.E., LEED Fellow, Hon. ASLA
Partner/ Director of Green Infrastructure
Services
Olin

Jacob Blue, RLA, ASLA
Landscape Architect/ Ecosystem Services
Project Manager
SAA Design Group

Meg Calkins, ASLA, LEED AP
Associate Professor of Landscape Architecture
Ball State University

Jenny Carney, LEED Fellow, LEED AP O+M
Principal
YR&G

Michael Clar, P.E., DWRE, CFM
Principal Engineer, President
Ecosite, Inc

Sandy Dymale, ASLA, LEED AP BD+C
Associate Principal
Mithun

Nora Goldstein
Executive Editor
BioCycle Magazine

Robert Goo
Environmental Protection Specialist
Office of Wetlands, Oceans and Watersheds,
Office of Water, U.S. Environmental Protection
Agency

Liz Guthrie, ASLA
Manager, Professional Practice Programs
American Society of Landscape Architects

Frances (Ming) Kuo, Ph.D.
Associate Professor and Director
Landscape and Human Health Laboratory
Department of Natural Resources
and Environmental Sciences Department of
Psychology
University of Illinois, Urbana-Champaign

David McDonald
Resource Conservation Planner
Seattle Public Utilities

Ray Mims
Conservation & Sustainability
United States Botanic Garden

Danielle Pieranunzi, LEED AP BD+C
Director, Sustainable Sites Initiative
Lady Bird Johnson Wildflower Center
The University of Texas at Austin

Mark Simmons, Ph.D.
Director, Research and Consulting
Ecosystem Design Group
Lady Bird Johnson Wildflower Center
The University of Texas at Austin

Jerry Smith, FASLA, EDAC, LEED AP
Principal
SMITH | GreenHealth Consulting, LLC

John C. Swallow, Ph.D., LSP
President and Director of Environmental
Sciences
Pine & Swallow Environmental

Steve Windhager, Ph.D.
Executive Director
Santa Barbara Botanic Garden

David J. Yocca, RLA, FASLA, AICP, LEED AP
Principal Landscape Architect/Planner
Conservation Design Forum

Acknowledgments

HUMAN HEALTH + WELL-BEING TECHNICAL SUBCOMMITTEE

Len Hopper, RLA, FASLA LEED AP, BSCP, ISA

Director of Production and Construction Services
Mark K. Morrison Landscape Architecture, PC

Frances (Ming) Kuo, Ph.D.

Associate Professor and Director
Landscape and Human Health Laboratory
Department of Natural Resources and Environmental Sciences Department of Psychology
University of Illinois, Urbana-Champaign

Karen R. Nikolai, M.P.H., M.C.P.

Health Community Planning Manager
Housing, Community Works and Transit Development
Hennepin County (MN)

Robert Ryan, Ph.D.

Professor of Landscape Architecture
University of Massachusetts, Amherst

Jerry Smith, FASLA, EDAC, LEED AP Principal

SMITH | GreenHealth Consulting, LLC

Rodney Swink, FASLA, PLA

Office of Rodney Swink

Kathleen L. Wolf, Ph.D.

Research Social Scientist
College of the Environment
University of Washington

MATERIALS TECHNICAL SUBCOMMITTEE

Meg Calkins, ASLA, LEED AP

Associate Professor of Landscape Architecture
Ball State University

Stephen Cook, ASLA, LEED AP+

Senior Landscape Architect
VIKA Maryland, LLC

Nora Goldstein

Executive Editor
BioCycle Magazine

Bradley Guy

Assistant Professor
School of Architecture and Planning
The Catholic University of America

Alison Kinn Bennett

Senior Advisor
Office of Pollution Prevention and Toxics
U.S. Environmental Protection Agency

SOILS TECHNICAL SUBCOMMITTEE

Fred Cowett, Ph.D.

Department of Horticulture
Cornell University

Susan D. Day, Ph.D.

Assistant Professor of Urban Forestry
Department of Forestry & Environmental Conservation
Department of Horticulture
Virginia Tech

David McDonald

Resource Conservation Planner
Seattle Public Utilities

John C. Swallow, Ph.D., LSP

President and Director of Environmental Sciences
Pine & Swallow Environmental

James Urban, FASLA

Consultant, Lecturer
Owner, Urban Trees + Soil

VEGETATION TECHNICAL SUBCOMMITTEE

Nina Bassuk, Ph.D.

Professor and Program Leader
Urban Horticulture Institute, Cornell University

Jacob Blue, RLA, ASLA

Landscape Architect/ Ecosystem Services
Project Manager
SAA Design Group

Nick Kuhn

Community Forestry Coordinator
Missouri Department of Conservation

Chris Martin, Ph.D.

Professor
Science and Mathematics Faculty
School of Letter and Sciences
Arizona State University

Melanie Sifton

Vice President, Horticulture & Facilities
Brooklyn Botanic Garden

Mark Simmons, Ph.D.

Director, Research and Consulting
Ecosystem Design Group
Lady Bird Johnson Wildflower Center
The University of Texas at Austin

John Peter Thompson

Bioeconomic Policy Analyst
Horticulture & Invasive Species Consultant
National Agricultural Research Alliance

Valerie Vartanian

Natural Resource Specialist
United States Navy (Ventura County)

Acknowledgments

WATER TECHNICAL SUBCOMMITTEE

Michael Barrett, Ph.D., P.E., D.WRE

Research Professor
Center for Research in Water Resources
The University of Texas at Austin

Steve Benz, P.E., LEED Fellow, Hon. ASLA

Partner/ Director of Green Infrastructure
Services
Olin

Keith Bowers, RLA, PWS

Landscape Architect/ Restoration Ecologist
President and Founder
Biohabitats, Inc.

Michael Clar, P.E., DWRE, CFM

Principal Engineer, President
Ecosite, Inc.

Robert Goo

Environmental Protection Specialist
Office of Wetlands, Oceans and Watersheds
Office of Water, U.S. Environmental Protection
Agency

Tom Liptan, RLA, FASLA

Landscape Architect/ Environmental Specialist

Edward MacMullan

Senior Economist
ECONorthwest

Michael Ogden, P.E., LEED AP

Principal Engineer
Biohabitats, Inc.

Eric Strecker, P.E., BCEE

Principal Engineer
Geosyntec Consultants

Megan Turnock, M.S., MLA

Associate
Lees & Associates Landscape Architects

Steve Windhager, Ph.D.

Executive Director
Santa Barbara Botanic Garden

**David J. Yocca, RLA, FASLA, AICP,
LEED AP**

Principal Landscape Architect/Planner
Conservation Design Forum

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STAFF

LADY BIRD JOHNSON WILDFLOWER CENTER
AT THE UNIVERSITY OF TEXAS AT AUSTIN

Danielle Pieranunzi, LEED AP BD+C

Director, Sustainable Sites Initiative

Lisa Storer, LEED AP BD+C

Senior Program Coordinator, Sustainable Sites
Initiative

Lana Denkeler, MLA, Associate ASLA

Program Coordinator, Sustainable Sites
Initiative

Jonathan Garner, MLA, ASLA

Program Coordinator, Sustainable Sites
Initiative

Michelle Bright, MLA, Associate ASLA

Research Assistant, Sustainable Sites Initiative

Regina Ramos

Research Assistant, Sustainable Sites Initiative

AMERICAN SOCIETY OF LANDSCAPE
ARCHITECTS

Liz Guthrie, ASLA

Manager, Professional Practice Programs
ASLA Staff Liaison, Sustainable Sites Initiative

UNITED STATES BOTANIC GARDEN

Ray Mims

Conservation & Sustainability
USBG Staff Liaison, Sustainable Sites Initiative

Design and layout by **Yellowfin Creative**

Site Plans of Project Examples (Sumac Nature Center and Live Oak Place) developed by
Susan Grantham

Proofreading/Copyediting services by **Kim McCormick**

The Sustainable Sites Initiative™ (SITES™) is a program dedicated to fostering resiliency and transforming land development and management practices towards regenerative design. The SITES v2 Rating System is a voluntary set of guidelines and performance benchmarks for assessing sustainable site design, construction, and maintenance. The central message of the SITES program is that any project—whether the site of a university campus, large subdivision, shopping mall, park, commercial center, or even a home—holds the potential to protect, improve, and regenerate the natural benefits and services provided by healthy ecosystems. The SITES program is a collaborative effort led by the United States Botanic Garden, the Lady Bird Johnson Wildflower Center at The University of Texas at Austin, and the American Society of Landscape Architects.



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