通过“场地可持续性设计行动计划”评级体系 推动绿色基础设施与生态系统服务发展

ADVANCING GREEN INFRASTRUCTURE AND ECOSYSTEM SERVICES THROUGH THE SITES RATING SYSTEM

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摘要

在创建高效的交通系统，减少城市热岛效应，满足人们对洁净水源、空气和开放空间不断增长的需求，以及保护野生动物栖息地等方面，世界各地的城市和社区正面临越来越艰巨的挑战。绿色建筑实践可以通过土地、能源和节水技术缓解这些方面的压力。人类在土地上建造的构筑物，深刻地影响着生态系统以及社区的健康、安全和福祉。场地可持续性设计行动计划®（SITES®）的提出基于以下认知：景观是建成环境中的一个关键元素，人们可通过设计和维护景观，来避免、减轻甚至扭转人类发展和气候变化带来的不利影响。与通常会随时间推移而贬值的建筑物不同，可持续景观通过持续提供多种效益（如雨洪管理、资源集约、污染治理，以及改善人类健康和福祉）而增值。无论其所在的场地是都市广场、城市公园、大学校园还是公司总部，景观都能作为生态弹性场所，更好地抵御偶发性洪水、干旱、野火及其他灾难，并从中迅速恢复。相较于传统的场地设计实践，使用了生态系统服务框架的SITES评级体系是一种更为有效的替代方法。

关键词

场地可持续性设计行动计划；可持续性；弹性；气候变化；生态系统服务

ABSTRACT

Cities and communities around the world face increasingly difficult challenges in creating efficient transit systems, reducing urban heat island effects, and addressing the ever-rising demand for clean water and air, open space, and wildlife habitat. Green building practices can alleviate many of these pressures through land, energy, and water conserving technologies. What is built on the land profoundly impacts ecological systems as well as the health, safety, and welfare of communities. The Sustainable SITES Initiative® (SITES®) is based on the understanding that landscapes are a crucial element of the built environment and can be designed and maintained to avoid, mitigate, and even reverse the common detrimental impacts of development and climate change. Unlike buildings that typically depreciate over time, sustainable landscapes appreciate in value by continuing to provide multiple benefits such as managing stormwater, conserving resources, reducing pollution, and improving human health and well-being. Whether the site is an urban plaza, city park, university campus, or corporate headquarters, landscapes can be ecologically resilient places better able to withstand and recover from episodic floods, droughts, wildfires, and other catastrophic events. Using an ecosystem services framework, the SITES Rating System is presented as an alternative and more effective approach to conventional site-design practices.

KEY WORDS

SITES; Sustainability; Resilience; Climate Change; Ecosystem Services

1 引言

2050年，全世界人口预计将超过90亿，其中70%将生活在城市区域。仅13年后（2030年），世界人口将增长11亿，而其中绝大多数将来自人口稠密的亚洲和非洲城市^[1]。随着世界人口的增长，城镇化和人类发展也将不断加速。在创建高效的交通系统，减少城市热岛效应，满足人们对洁净水源、空气和开放空间不断增长的需求，以及保护野生动物栖息地等方面，城市正面临越来越艰巨的挑战。而绿色建筑实践，则可通过土地、能源和节水技术等缓解这些压力。

2015年6月，随着绿色业务认证公司（GBCI）宣布将场地可持续性设计行动计划（SITES®）项目及其“最终”产品——“SITES 2.0版评级体系：可持续土地设计及发展”纳入旗下^[2]，人们又获得了一项倡导可持续性景观规划与设计措施的重要新型工具。这一举措为我们带来了在规划与设计中将建成环境和自然环境相融合的机会，同时也将生态系统服务置于决策制定过程中的最前沿。GBCI于2008年成立，由美国绿色建筑委员会（USGBC）组建，它独家管理着USGBC旗下能源与环境设计先锋（LEED®）绿色建筑项目的开发计划、项目认证和专业证书颁发工作，以及越来越多的其他评价体系。

SITES发展伊始，USGBC和GBCI即鼓励建立一个景观可持续性体系，作为对LEED项目中建筑绩效的补充和呼应。SITES评级体系提供了一个全面的指南，以界定和强调场地开发的可持续性，衡量其绩效，最终评估这些项目的环境、经济和社会效益。SITES旨在为景观设计师、城市设计师、城市规划师、工程师、建筑师、开发商、决策者及其他从事土地设计和开发工作的人群提供便利。SITES对绿色基础设施的规划有着特殊的意义。

LEED认证目前被应用于150多个国家和地区，而经GBCI认证的LEED建筑的累计面积已超过1 254.2km²，经LEED资格认证的专业人士超过20.1万人。SITES具有类似的潜力，随着时间的推移，其将推动更多可持续的土地开发，并增加人们对生态系统服务的了解，正是在这一框架之下，SITES评级体系才得以开发。

1 Introduction

By 2050, the world’s population is projected to exceed nine billion people with 70 percent living in urban regions. In just 13 years (2030), 1.1 billion more people will likely join us, mostly in dense Asian and African cities^[1]. As the world’s population grows, so too does the pace of urbanization and development. Cities face increasingly difficult challenges in creating efficient transit systems, reducing urban heat island effects as well as addressing the ever-rising demand for clean water and air, open space, parks, and wildlife habitat. Green building practices can alleviate many of these pressures through land, energy and water conserving technologies.

In June of 2015, advocates of sustainable approaches to landscape planning and design received an important new tool when the Green Business Certification Inc. (GBCI) announced its acquisition of the Sustainable SITES Initiative® (SITES®) program and its “final” product, the SITES v2 Rating System: For Sustainable Land Design and Development^[2]. The acquisition creates opportunities for integrating the built and natural environments in planning and design, and bringing ecosystem services to the forefront of decision-making. Established by the U.S. Green Building Council (USGBC) in 2008, GBCI is the exclusive administrator for program development, project certification and professional credentialing for USGBC’s LEED® (Leadership in Energy and Environmental Design) green building programs and a growing number of other systems and programs.

From the earliest phases of SITES development, USGBC and GBCI encouraged creation of a landscape sustainability system that would complement and supplement the LEED program for building performance. The SITES Rating System provides a comprehensive road map for defining and enhancing sustainability in site development, for measuring its performance, and ultimately for assessing the environmental, economic, and social benefits of such projects. SITES is intended for use by landscape architects, urban designers, city planners, engineers, architects, developers, policy makers, and others that work on land design and development. SITES has special significance for the planning of green infrastructure.

LEED is now used in more than 150 countries and territories. GBCI has certified LEED buildings representing more than 13.5 billion square feet (1,254.2 square kilometers) of space and accredited more than 201,000 professionals with LEED professional credentials. The SITES program has similar potential, over time, to drive more sustainable land development and increase understanding of ecosystem services, the framework under which it was developed.

SITES也受到了美国以外的地区的关注。例如，2011年，澳大利亚景观设计师协会对SITES进行了探索和检验，研究其在本国的潜在应用价值。此外，在2010年初申请参加SITES试点计划的350个项目中，即有部分位于阿根廷、澳大利亚、巴西、加拿大、冰岛、墨西哥、菲律宾和西班牙等美国以外的地区。其中，来自加拿大、冰岛和西班牙的5个项目最终通过了2009年版SITES评级体系（或称SITES 1.0版）的实地评估。随着GBCI国际研究范围的不断扩大，SITES有望被广泛应用于世界范围内高性能景观的创建中，以解决气候变化和城镇化所带来的紧迫问题。截至2017年1月，申请SITES 2.0版认证的项目已覆盖中国香港、日本、印度、加拿大和美国等地区，其中已有两个位于美国的项目通过了该版评级体系的认证。

2 SITES的原则和目的

21世纪初，在可持续性设计、土地利用规划、景观设计、生态、水文、土壤、植物学、公共卫生及其他专业领域的美国专家开始讨论基于生态原则进行的区域适宜性景观设计的必要性及其潜在效益。专家组由德克萨斯大学奥斯汀分校的伯德·约翰逊夫人野花中心、美国植物园和美国景观设计师协会共同创立并领导，他们认识到了LEED项目对推进绿色建筑的巨大影响。虽然LEED项目已包括了一些与资源相关的策略，如使用本土植物和节水技术，但这显然不够；不论景观中是否包含建筑物，都需要为其建立一个独立的评价体系，与LEED认证形成互补。

2006年，SITES项目启动，作为一次跨学科的尝试，其为可持续性土地设计、建造和维护制定全面严格的指南和绩效基准，以提升景观的价值。SITES评级体系是针对单个项目而创建的独立工具，但其同时也是一种可以影响、致敬或纳入LEED及其他绿色开发体系和项目的设计方法。它适用于新的建造项目或现有场地的大规模改造，亦可作为衡量绩效和指导项目设计的手段。将SITES评级方法纳入市政或其他建

SITES has also drawn attention outside the United States. For example, in 2011, the Australian Institute of Landscape Architects, explored and tested SITES to better understand its potential application in that country. In addition, among the 350 projects that applied to participate in the SITES pilot program in early 2010, several were located outside the United States in Argentina, Australia, Brazil, Canada, Iceland, Mexico, the Philippines, and Spain. Five in Canada, Iceland, and Spain were ultimately accepted to field-test the 2009 version of the SITES rating system (or SITES version 1). As GBCI continues to extend its international research, it is expected that SITES will become a broadly employed tool in creating high functioning landscapes that address urgent issues resulting from climate change and urbanization. As of January 2017, there are projects registered for SITES v2 certification in Hong Kong, Japan, India, Canada and the United States. As of this time, two projects have been certified under the SITES v2 Rating System, both of which are located in the United States.

2 The Sustainable SITES Initiative — Principles and Purpose

In the early 2000s, U.S. leaders in sustainable design, land-use planning, landscape architecture, ecology, hydrology, soil, botany, public health, and other areas of expertise began discussing the need for and potential benefits of regionally appropriate landscape design based on ecological principles. Founded and led by the Lady Bird Johnson Wildflower Center at the University of Texas at Austin, the U.S. Botanic Garden, and the American Society of Landscape Architects, the group acknowledged the tremendous impact of the LEED program in advancing green building. Although LEED included some resource-related strategies, such as use of native plants and water conserving technologies, it became apparent that more was needed and could be accomplished with a complementary system for landscapes that may or may not contain buildings.

In 2006, the Sustainable SITES Initiative was launched as an interdisciplinary effort to elevate the value of landscapes by creating comprehensive and rigorous guidelines and performance benchmarks for sustainable land design, construction, and maintenance. The SITES Rating System was created as a stand-alone tool for individual projects, but also as a design approach that could influence, compliment, or be incorporated into LEED or other green development systems or programs. It is intended for new construction projects or major renovation of existing sites and can be used as a means to measure performance and guide the design of projects. Incorporating SITES approaches in

筑标准和实践中，或由开发商和规划者自愿采用，既可以帮助我们为人类和野生动物创造高性能的室外空间，也可提高社区的整体弹性。

正如LEED项目所反映的关于建筑能效的知识自20世纪70年代以来经历了逐步的演进，SITES项目也是从最初由伊恩·麦克哈格^[3]提出的“设计遵从自然”的论点发展而来。SITES团队肯定了由约翰·莱尔^[4]在20世纪70年代和80年代开创的再生设计理念。麦克哈格和莱尔都认为，设计而成的系统应仿照自然系统的生态绩效。

基于上述环境设计理论的丰富历史，SITES团队于2007年提出了几项原则，以指导项目开发并阐明创建可持续项目的要素（表1）。

municipal or other building standards and practices, as well as voluntary adoption of the program by developers and planners, can help create high functioning outdoor spaces for people and wildlife, while increase a community’s overall resilience.

Just as the LEED program reflected knowledge about building efficiency that had evolved since the 1970s, the Sustainable SITES Initiative grew from the argument originally advanced by Ian McHarg^[3] that design should be guided by nature. The SITES team acknowledged the regenerative design ideas pioneered in the 1970s and 1980s by John Lyle^[4]. Both McHarg and Lyle argued that designed systems should replicate the ecological performance of natural systems.

Drawing from this rich history of environmental design theory, in 2007 the SITES team adopted the principles to guide development of the program and clarify the elements of creating a sustainable project (Table 1).

表1：SITES评级体系指导原则
Table 1: SITES Guiding Principles

1	无危害 Do no harm	不对场地造成任何危害，以免使周围的环境退化。选择适宜的场地进行改造，场地之前受到的干扰或经历的发展转成为一种机遇，使其能够通过可持续设计更新生态系统服务。 Make no changes to the site that will degrade the surrounding environment. Promote projects on sites where previous disturbance or development presents an opportunity to regenerate ecosystem services through sustainable design.
2	采取预防原则 Adopt the precautionary principle	决策须谨慎，应避免对人类及环境健康造成威胁。人类的一些行为会导致不可逆转的损害。在决策之前，要听取可能受影响的各方的意见，考量所有可行的，甚至不采取任何措施的方案。 Be cautious in making decisions that could create risk to human and environmental health. Some actions can cause irreversible damage. Examine a full range of alternatives — including no action — by being open to contributions from all potentially affected parties.
3	依据自然和文化进行设计 Design with nature and culture	设计的创建与实施均需以当地、区域或全球背景下的经济、环境及文化条件为基础。 Create and implement designs that are responsive to economic, environmental, and cultural conditions with respect to the local, regional, and global context.
4	采用保护、保存和再生的分层级决策过程 Use a decision-making hierarchy of preservation, conservation, and regeneration	通过保护现有环境的特征，以可持续的方式节约资源，并更新遗失或遭破坏的生态系统服务功能，将生态系统服务效益最大化。 Maximize and mimic the benefits of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.
5	创建可再生的系统，实现代际平衡 Provide regenerative systems as intergenerational equity	通过赋予其可再生的系统及资源，为后代提供可持续的环境。 Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.
6	维持动态过程 Support a living process	不断重新评估假设与价值，以适应人口和环境的变化。 Continuously re-evaluate assumptions and values and adapt to demographic and environmental change.
7	使用系统思维方法 Use a systems thinking approach	理解和重视生态系统中的各重关系，采取能够反应和维持生态系统服务的方法，重建能够维持自然过程和人类活动之间不可或缺且必要的关系。 Understand and value the relationships in an ecosystem and use an approach that reflects and sustains ecosystem services and re-establishes the integral and essential relationship between natural processes and human activity.
8	采取合乎道德的协同性方法 Use a collaborative and ethical approach	鼓励设计师、客户、生产商及用户之间直接而开放的交流，以将长期有效的可持续性与伦理责任联系起来。 Encourage direct and open communication among colleagues, clients, manufacturers, and users to link long-term sustainability with ethical responsibility.
9	保证领导和研究的完整性 Maintain integrity in leadership and research	实施透明、参与式的领导方式，在开展研究的过程中秉持技术严谨性，并清晰、连贯而及时地交流新发现。 Implement transparent and participatory leadership, developing research with technical rigor, and communicate new findings in a clear, consistent, and timely manner.
10	促进环境管理 Foster environmental stewardship	在土地开发和管理的各方面，建立环境管理道德体系——认识到对于健康生态系统的负责任的管理有益于提高当前和未来子孙的生活质量。 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.

SITES团队以生态系统服务为基础，旨在将这些原则转化为设计和开发的指南及指标。资源经济学家们也已采用生态系统服务这一术语来描述自然环境为人类无偿提供的益处，以及一旦自然环境停止供给，人类将不得不找到其替代品的代价^{[5][6]}。这些服务包括（但不限于）净化空气，控制侵蚀，维持可钓鱼、可游泳和可饮用的水源，调节气候，循环利用养分和废弃物，以及提供旅游和娱乐场所^[7]。2011年，全球生态系统服务估值达到约125万亿美元/年，约为全球国内生产总值的三倍^[8]。

对一个重要项目的成本 and 价值的准确评估，应包括对该项目减损或增强生态系统服务程度的全面计量^[2]。所规划的景观和绿色基础设施有能力保护甚至再生自然系统。通过测量或估算项目场地在项目建设前后提供的生态系统服务和自然资本的价值，我们可以更全面地了解 and 估计项目的价值及其对短期和长期生态安全的影响。例如，当湿地因场地开发而消失，人们必须建造新的造价昂贵的管道、堤坝和污染控制设施，以发挥原有湿地所天然具备的提供风暴潮防护、防洪和净化水体等功能^[2]。此外，湿地还可能提供其他额外的效益，如作为野生动物栖息地及用于休闲和旅游。与之相比，在前期规划和设计中保护或增强这些自然功能，可降低后期用于替代和维护这些功能设施的实际成本，从而使环境与社区受益。

SITES 2.0版评级体系列举了一系列与生态系统服务（表2）相关的具体举措。这些举措包括减少温室气体排放、净化空气和水、保护水资源、控制侵蚀和沉积、降低灾害、保护和恢复传粉媒介及其他栖息地功能、分解和处理废弃物、支持粮食生产，以及增强人类健康和福祉。此外，SITES以弹性概念为基础，弹性即一个系统在面对动荡变化时的生存、适应和繁荣的能力^{[9]–[11]}。健康的自然系统往往天然具备弹性，但许多人类建造的系统则因设计不当而仅处于“维系生命”的状态，其中的物种需依赖额外的灌溉和肥料才能茁壮成长。

The SITES team embraced ecosystem services as the foundation for converting these principles into design and development guidelines and metrics. Resource economists have adopted the term to describe those benefits that the natural environment provides to humans for free, and which humans would have to find ways to replace if the natural environment ceased to provide them^{[5][6]}. These services include but are not limited to filtering air pollutants; controlling erosion; maintaining fishable, swimmable, and drinkable water; regulating climate; cycling nutrients and waste; and supporting tourism and recreation^[7]. In 2011, the value of global ecosystem services was estimated to be approximately \$125 trillion/year, about three times the global gross domestic product^[8].

An accurate assessment of the cost and value of a significant project should include a full accounting of the project’s diminishment or enhancement of ecosystem services^[2]. Planned landscapes and green infrastructure have the capacity to protect and even regenerate natural systems. Measuring or estimating the value of ecosystem services and natural capital provided on a project site before and after construction can inform a more thorough understanding and estimate of a project’s value as well as its impacts on ecological security in the short and long term. For example, when wetlands are lost to development, new and costly pipes, levees, and pollution-control technology must often be constructed to perform the functions those wetlands previously provided naturally, including storm-surge protection, flooding control, and water filtration^[2]. Additional benefits may also be provided, such as wildlife habitat which may also contribute to recreation and tourism. In contrast, front-end planning and design that protects or enhances these natural functions can benefit the environment and communities by reducing the real costs of maintaining and replacing them.

The ecosystem services addressed in the SITES v2 Rating System (Table 2) are linked to specific actions. They include reduction of greenhouse gas emissions, filtration of air and water pollutants, water conservation, erosion and sediment control, hazard mitigation, conservation and restoration of pollinator and other habitat functions, waste decomposition and treatment, support for food production, and enhancements to human health and well-being. Also, fundamental to SITES is the concept of resilience, defined as the capacity for a system to survive, adapt, and flourish in the face of turbulent change^{[9]–[11]}. While healthy natural systems tend to be inherently resilient, many constructed systems are poorly designed and on “life support” needing supplemental irrigation and fertilizer to thrive.

表2：生态系统服务
Table 2: 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. <i>The Millennium Ecosystem Assessment 2005</i> 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). The Sustainable SITES Initiative has referenced various existing versions of ecosystem services to create the following list of those that a site can protect or regenerate through sustainable land development and management practices.
1	全球气候调节：保持大气气体平衡，使其维持在历史水平，带来可呼吸的空气，隔绝温室气体 Global climate regulation: Maintaining balance of atmospheric gases at historic levels, creating breathable air, and sequestering greenhouse gases	
2	当地气候调节：通过荫蔽、蒸发蒸腾和设立防风林来调节当地的气温、降雨和湿度 Local climate regulation: Regulating local temperatures, precipitation, and humidity through shading, evapotranspiration, and windbreaks	
3	净化空气和水：去除并减少空气和水中的污染物 Air and water cleansing: Removing and reducing pollutants in air and water	
4	水的供应和调节：在流域和地下水层中储存和取用水资源 Water supply and regulation: Storing and providing water within watersheds and aquifers	
5	控制侵蚀和沉积：保持生态系统内的土壤水平，防止侵蚀和河道沉积所造成的危害 Erosion and sediment control: Retaining soil within an ecosystem, preventing damage from erosion and siltation	
6	降低灾害：减少洪水、风暴潮、野火和干旱所带来的危害 Hazard mitigation: Reducing vulnerability to damage from flooding, storm surge, wildfire, and drought	
7	授粉：为农作物或其他植物繁殖提供传粉媒介物种 Pollination: Providing pollinator species for reproduction of crops or other plants	
8	栖息地功能：为植物和动物提供庇护和繁殖的栖息地，继而促进对生物及遗传多样性、进化过程的保护 Habitat functions: Providing refuge and reproduction habitat to plants and animals, thereby contributing to conservation of biological and genetic diversity and evolutionary processes	
9	废弃物分解和处理：废弃物分解和养分循环 Waste decomposition and treatment: Breaking down waste and cycling nutrients	
10	有益于人类健康及福祉 Human health and well-being benefits	
11	通过与自然的互动增强身体、精神及社会福祉 Enhancing physical, mental, and social well-being as a result of interaction with nature	
12	食品和可再生的非食品类产品：生产食品、燃料、能源、药品或其他供人类使用的产品 Food and renewable non-food products: Producing food, fuel, energy, medicine, or other products for human use	
13	文化裨益：通过与自然的互动，增强人们的文化、教育、美学及精神体验 Cultural benefits: Enhancing cultural, educational, aesthetic, and spiritual experiences through interaction with nature	

注：来源于《SITES 2.0版评级体系：可持续场地设计和开发》^[1]

Note: Source from *SITES v2 Rating System: For Sustainable Land Design and Development*^[1]

除了消耗稀缺资源和造成污染外，人类建造的景观往往容易受到自然和人为的破坏。相比之下，可持续景观中所创造的场所更具生态弹性，能够更好地抵御偶发性洪水、干旱、野火和其他灾难，并从中迅速恢复^[2]。在SITES 2.0版评级体系的设计中，促进弹性这一目标贯穿始终，例如，它要求对关键的、功能性的自然景观元素（如湿地和洪泛平原）进行保护，并鼓励对退化地区进行生态修复。

典型的开发过程通常忽视景观设计问题，仅在项目规划甚至整个开发过程的收尾阶段才加以考虑。相反，SITES将这些举足轻重的考量过程置于项目规划之前，同时促进建筑和景观设计相结合。从SITES的目的来说，一块“场地”即整个项目正在经历开发和管理（包括保护和恢复）的区域范围。评级体系可应用于任何场地，无论是在城市、郊区还是乡村，这些场地都将受到保护，并被开发用于公共或私人项目。尽管SITES适用于绿地、灰地和棕地，但它也强烈鼓励人们通过其评级体系重新开发已退化的场地，以恢复场地丧失的生态系统服务。SITES的核心目标是使任何一个开发项目——无论其为商业场地、公园、住宅景观、公共花园、校园，还是寻常的街边绿地——均具备保护和再生生态系统服务的能力^[2]。

3 SITES的开发过程

SITES 2.0版评级体系的开发经历了多年的迭代过程，它高度强调透明性与跨学科合作。自2006年以来，SITES吸纳了广泛的研究成果，与不同领域的专家小组合作，开展了一项试点项目，力图为可持续土地设计与开发制定标准，并使其具备足够的灵活性以逐步应用在美国和世界各地的不同场地上。

2006年，SITES委员会成立并开始引领这项计划和评级体系的开发。除了其创始组织外，该委员会还包括多个利益相关团体，如美国环境保护局、美国国家游憩与公园协会、美国土木工程师协会，以及

Aside from consuming scarce resources and contributing to pollution, these landscapes are often vulnerable to natural and human-made disruptions. In contrast, sustainable landscapes create ecologically resilient places better able to withstand and recover from episodic floods, droughts, wildfires, and other catastrophic events^[2]. The goal of promoting resilience is embedded throughout the SITES v2 Rating System; for example, it requires the conservation of critical, functioning natural features (e.g., wetland and floodplains) and rewards ecological restoration of degraded areas.

Typical development processes often attach minimal importance to landscape design issues and consider them only at the end of project planning and even development. In contrast, SITES moves these critical considerations to the front of project planning, and facilitates integrated building and landscape design. A “site,” for the purposes of the SITES program, is defined as the entire project area that is experiencing development and management (including conservation and restoration). The Rating System is designed for any site, whether urban, suburban or rural, which will be protected and developed for public or private purposes. Although SITES is available for use by greenfield, greyfield, and brownfield sites, it strongly encourages the redevelopment of degraded sites through its credit system in order to restore ecosystem services where they have been lost. The central purpose of SITES is that any development project — commercial sites, parks, residential landscapes, public gardens, academic campuses, roadsides, and more — has the capacity to protect and regenerate ecosystem services^[2].

3 The Sustainable SITES Initiative — Process

The SITES v2 Rating System was developed through a multi-year iterative process that emphasized transparency and interdisciplinary collaboration. Since 2006, the SITES program has compiled extensive research findings, worked with panels of experts across diverse fields, and conducted a pilot program to create criteria for sustainable land design and development with sufficient flexibility to be applied on a site-by-site basis throughout the United States and worldwide.

Beginning in 2006, a SITES committee was formed to guide the development of the program and the rating system. In addition to the founding organizations, the committee included a diverse group of interested parties including the U.S. Environmental Protection Agency, the National Recreation and Park Association, the American Society of Civil Engineers, leading U.S. landscape architecture firms, and others. Drawing

一些杰出的美国景观设计公司等。基于LEED项目和其他绿色开发工具的成功经验，委员会采用了与之类似的严格方法，创建了以绩效为核心的标准体系。

随后成立的技术小组委员会，吸引了60多位来自5个关键领域（土壤、植被、水、材料和人类健康与福祉）的美国知名专家，包括专业学者、科学家、从业人员和决策者。该小组委员会的职责为研究并综合现有的科学与艺术前沿，以为场地规划、设计、建造、运营和维护等活动制定严格、全面的准则和指标。

SITES评级体系旨在创建清晰而实用的景观绩效标准，以促进专业实践和市场转型。该体系不是简单地奖励那些遵守某些指定方式，或具备一系列理想特性的项目，而是强调可量化的绩效结果，以及对生态服务和自然功能的保护与增强。在整个发展过程中，SITES除收集非正式的公众意见外，还安排了三段正式的公众意见征询期。

2007年，第一份SITES报告《标准和指南：初步报告》^[12]发布，其中提出了SITES的必要性和基本原理，确定了可持续景观的核心目标、策略和工具，并概述了该计划下一步的安排。2007年公共意见征询期期间的公众反馈以及对绩效评估的进一步研究，被纳入了下一份报告——《指南和绩效基准草案（2008年版）》中，该报告介绍了评级制度框架^[13]。而2008年的报告所收到的反馈，又对制定《指南和绩效基准（2009年版）》（即2009年版SITES评级体系）起到了非常重要的作用，该体系首次包纳了为每个评分项分配分值的评级体系^[14]。此报告被称为“版本1”或“SITES 1.0版”，而只有参与试点的项目才能够使用这套评级体系进行认证。

4 SITES评级体系实地评估

《指南和绩效基准（2009年版）》反映了公众对于2007年和2008年报告的早期意见以及来自各个学科专家们的广泛研究成果，而实地评估则是SITES评级体系发展过程中的另一关键环节。

from the success of the LEED program and other green development tools, the committee adopted a similarly rigorous approach in creating performance-based benchmarks.

Technical subcommittees were then established that included a committed group of more than 60 recognized experts from across the United States (academics, scientists, practitioners, and policy-makers) in five critical areas: soil, vegetation, water, materials, and human health and well-being. The subcommittees were charged with examining and synthesizing the best available science and art in order to establish rigorous and comprehensive guidelines and metrics for site planning, design, construction, operations, and maintenance practices.

The SITES Rating System was designed to create clear and practical benchmarks for landscape performance in order to advance professional practice and transform the market. Rather than simply rewarding projects for compliance with certain prescriptive measures, or for incorporating a list of desirable features, the system emphasizes measurable performance outcomes and the conservation and enhancement of ecological services and natural functions. Throughout its development process, SITES sought advice from the general public that was received informally and through three formal public comment periods.

In 2007, the first SITES report, *Standards and Guidelines: A Preliminary Report*^[12], was released which presented the need and rationale for the SITES program; identified its key goals, strategies, and tools for sustainable landscapes; and outlined the next steps for the program. Reaction from the 2007 public comment period, as well as additional research into performance measures, was incorporated into the next report, the *Guidelines and Performance Benchmarks Draft 2008*, which introduced the framework for a rating system^[13]. Comments on the 2008 report were important in the development of the *Guidelines and Performance Benchmarks 2009* (i.e., SITES 2009 Rating System) which for the first time incorporated a rating system with assigned point values to each credit^[14]. This report is considered to be “version 1” or “SITES v1” and certification according to this system was only available to participating pilot projects.

4 Field-testing SITES

The Guidelines and Performance Benchmarks 2009 reflected earlier public comments about the 2007 and 2008 reports as well as extensive research from experts in a variety of disciplines. Field-testing was the remaining critical step in the development of the SITES Rating System.

试点计划于2010年启动，依据评分规则和相关文件，以及分配给每个评分项的分数（或数值）和在总体认证级别下的公平性和适当性，对评分的难度和认证的基本要求进行评估，从而检测和完善《指南和绩效基准（2009年版）》。选择的试点项目致力于检测SITES是否能够成功应用于不同气候、地点和环境下的开发项目。同时，它们也提供有关SITES是否适用于不同类型、规模和预算的项目方面的信息。该试点计划旨在将具体的项目作为研究案例，以展示效益，明确实施可持续实践所要面临的挑战，并使参与的试点项目能够获取在2009年版SITES评级体系下优先通过认证的机会。

截至2015年初试点阶段结束时，共有47个试点项目满足了全部15个基本要求，并从2009年版SITES评级体系中的51个可选评分项中获得至少100分的成绩，成功取得认证。这些项目分布于美国的20个州（图1），在规模、成本、规划和环境等方面均有所差异，也囊括了公共、公私合作以及私人投资等形式（表3）。这些成功项目大多位于城市（55%）和郊区（38%），其中83%由退化或受污染区域（棕地或灰地）重建而

The pilot program was launched in 2010 to test and refine *Guidelines and Performance Benchmarks 2009*, by assessing the level of difficulty of the credits and prerequisites for certification, in terms of the requirements and the related documentation for credit compliance, and the fairness and appropriateness of the points (or value) assigned to each credit and with the overall certification levels. The selected pilot projects were chosen to test whether SITES could be successfully applied to development projects in diverse climates, locations, and contexts. They also yielded information about SITES applicability for projects of different types, sizes, and budgets. The pilot program was intended to generate case studies of specific projects to demonstrate the benefits, identify the challenges of implementing sustainable practices, and to provide the participating pilot projects with the first opportunity to achieve certification under the SITES 2009 Rating System.

By the end of the pilot phase in early 2015, 47 pilot projects had achieved certification by meeting all 15 of the prerequisites and accruing a minimum of 100 points from the 51 optional credits in the SITES 2009 Rating System. Located in 20 U.S. states (Fig. 1), these works ranged in size, cost, program, and context. They represented public, private-public partnerships, and privately funded undertakings (Table 3). The successful projects were overwhelmingly urban (55 percent) and suburban (38 percent), and 83 percent of them involved redevelopment of

1. 经2009年版SITES评级体系认证的47个试点项目所在位置

1. U.S. map of the 47 pilot projects certified under the SITES 2009 Rating System

表3：经认证的试点项目情况概览
Table 3: Summary of Certified Pilot Projects

成，充分证明了这些场地恢复和重建生态系统服务的能力。许多试点项目场地中的生态系统服务得以优化，具体表现为提供了更多样化的功能和效益，包括雨洪管理、水质优化、野生动物栖息地改善、资源集约、污染和废弃物减少，以及公共无障碍设施和公众游憩设施的建立等。

根据其绩效和得分，试点计划中的项目获得的认证被分为一星到四星4个等级。大多数认证作品（79%）获得了一星或二星级认证。在全部47个认证项目中，有9个项目获得了三星评级，而获得四星级（最高级）认证的项目只有一个，即位于宾夕法尼亚州匹兹堡市的皮普斯温室可持续景观中心。这些统计数据充分地显示了SITES 2.0版评级体系的开发潜能。

degraded or contaminated areas (i.e., brownfields or greyfields), demonstrating the capacity for restoration and regeneration of ecosystem services on those sites. Many of the pilot projects optimized their sites to provide multiple functions and benefits, including stormwater management, water quality enhancements, wildlife habitat improvements, resource conservation, pollution and waste reduction, and public accessibility and enjoyment.

Projects in the pilot program were awarded certification ranging from one to four stars, based on their performance and the number of credit points they achieved. The majority of the certified works (79 percent) earned one or two star certification. Nine out of the 47 certified projects earned three stars while only one, the Center for Sustainable Landscapes at the Phipps Conservatory in Pittsburgh, Pennsylvania, earned the four-star certification, the highest level of recognition. These findings significantly informed the development of the SITES v2 Rating System.

5 试点项目范例

下文将以华盛顿运河公园项目为例，对经2009年版SITES评级体系（SITES 1.0版）认证的试点项目予以说明。该项目及其他获得认证的项目为我们阐明了SITES准则和SITES评级体系在各种环境下的应用情况。^①

作为在哥伦比亚特区阿纳科斯蒂亚海滨计划下建成的第一批公园之一，华盛顿运河公园是可持续设计的典范，它获得了LEED金牌认证和作为SITES试点项目的三星级认证（图2）。这座占地1.21hm²的公园坐落在一座先前为校车停车场的场地中，沿着历史悠久的华盛顿运河横跨约三个街区，现已成为一处极受大众欢迎的社交聚会场所，并带动了该地区新的经济活动。

受该地区滨水区域的启发，运河公园的设计唤起了人们对其所在区位的历史记忆，这里的线性雨水花园和三座凉亭，使人不禁回想起曾经漂在水上的驳船。通过与城市当局及相关人士的协作，来自费城的OLIN事务所为这里设计了一座836m²的阁亭，包括咖啡馆和餐饮区。在场地内的溜冰场下，28口地热井为公园提供了高效的能源。地热能源的使用预计将使运河公园的总体能源消耗降低37%。各种各样的本土及外来植被被应用于雨水花园和整个运河公园中（图3）。其他可持续性设计元素还包括暗夜照明元素、高反射率铺装及其他鼓励可持续发展的场地景观，如自行车架、电动汽车充电站和回收箱等。

5 An Example of Pilot Project

The following example of Washington Canal Park provides the description of a pilot project certified under the 2009 version of the SITES Rating System (SITES v1). Together with other projects, they illustrate ways in which SITES principles and the SITES Rating System can be applied in a variety of settings.^①

One of the first parks built as part of the District of Columbia’s Anacostia Waterfront Initiative, Washington Canal Park is a model of sustainability, attaining both LEED Gold certification and a three-star certification as a SITES pilot project (Fig. 2). Located on three acres (1.21 hectares) of a former school bus parking lot, this three-block long park lies along the historic former Washington Canal and has become a popular social gathering place as well as a catalyst for new economic activity in the area.

Inspired by the area’s waterfront, Canal Park’s design evokes the history of its location, featuring a linear rain garden and three pavilions reminiscent of the barges that once floated on its waters. Working with the city and others, the Philadelphia firm OLIN designed a 9,000 square-foot (836 square-meter) pavilion to host a café and dining area. Underneath the site’s ice rink, 28 geothermal wells provide a highly efficient energy supply for utilities in the park. The use of geothermal is expected to reduce Canal Park’s overall energy use by 37 percent. Native and adapted plants were installed in the rain garden and throughout Canal Park (Fig. 3). Other sustainable design elements included dark-sky lighting elements, high albedo paving, and site features that encourage sustainable practices, such as bicycle racks, electric car charging stations, and recycling bins.

① 如需了解更多的案例研究，请访问：www.sustainablesites.org/projects。

① More case studies can be found at www.sustainablesites.org/projects.

② 更多关于SITES 2.0版评级体系和《参考指南》的信息，可访问：<http://www.sustainablesites.org>。

② Both the SITES v2 Rating System and *Reference Guide* are available at www.sustainablesites.org.

总体而言，华盛顿运河公园的主要绩效目标是创造水弹性，需要解决的问题包括水源稀缺、洪水灾害和水质污染。线性雨水花园是整个公园的焦点，作为一个综合性雨水系统，其预计每年将为哥伦比亚特区节约150万加仑（570万升）饮用水。有了这座雨水花园、低影响开发式树坑，以及8万加仑（30万升）的蓄水能力，公园内产生的所有雨水径流几乎都将被收集、处理并循环使用，可满足95%的公园用水需求，包括喷泉、厕所冲洗、灌溉和溜冰场用水。

此项目的另外一个重要特点是其对附近街区的可持续性贡献。运河公园所管理的这座社区规模的雨水系统，其覆盖范围超越了自身的边界，可收集、处理和回收利用附近场地及建筑物屋顶的雨水径流。运河公园由一个公私合营的组织开发，它计划向邻近的土地所有者就这项雨洪管理服务收取费用。这将有助于促进运河公园的长期而显著的经济效益，并在这个曾经的工业区有效鼓励城市填充式开发。

运河公园的开发者包括华盛顿特区环境部。项目的成功促使环境部积极采用了更为有效的水管理政策，并实施水质保护。该市政机构将运河公园视为一座示范项目，其总体方案开发、环境评估以及后期维护协议，均被环境部作为规划与设计样本，用于指导未来类似的绿色基础设施建设。

6 SITES 2.0版评级体系

《SITES 2.0版评级体系：可持续土地设计和开发》^[1]于2014年6月发布，标志着历时8年研发的巅峰。SITES 2.0版是第一个对公众开放，用作获取景观设计认证的基础性评级体系。随附的手册《SITES 2.0版参考指南》包括评级体系以及详细的实施指南，对确认项目是否符合特定的得分指标所需的材料进行了描述，对这些得分指标与使场地绩效最大化的方法之间的相互关系予以了说明，并介绍了一些其他资源供用户访问和使用。^②

Overall, creating water resilience was a primary performance goal for Washington Canal Park and required addressing issues of scarcity, flooding, and quality. The park’s focal point, the linear rain garden, functions as an integrated stormwater system that is estimated to save the District of Columbia 1.5 million gallons (5.7 million liters) of potable water each year. With the rain garden, low impact development tree pits, and the capacity to store 80,000 gallons (302,833 liters) of water storage capacity, almost all of the stormwater runoff generated by the park will be captured, treated, and reused to satisfy as much as 95 percent of the park’s water needs for fountains, toilet flushing, irrigation, and an ice rink.

An important element of the project is its contribution to neighborhood sustainability. Canal Park manages a community-scale program that reaches beyond its boundaries to capture, treat, and recycle roof and site runoff from nearby buildings. The Canal Park Development Association (a public / private partnership) plans to charge a fee to neighboring landowners for the use of this rainwater management service. This will contribute to the long-term economic visibility of Canal Park and encourage urban infill development in this previously industrial area.

Development of Canal Park involved collaboration with the Washington, D.C. Department of the Environment. Its success led to the department’s adoption of more effective water management policies and water quality protections. The city agency considers Canal Park a demonstration project, and development of the general schematic, the environmental assessment, and adoption of a maintenance covenant will be used by the department as the planning and design model for future projects with similar green infrastructure goals.

6 The SITES v2 Rating System

SITES v2 Rating System: For Sustainable Land Design and Development^[1], released in June 2014, represented the culmination of the eight years of research and development. SITES v2 is the first rating system available for the public to use as a basis for achieving landscape design certification. An accompanying manual, the *SITES v2 Reference Guide*, includes the rating system as well as detailed guidance for implementation. The *Reference Guide* describes the documentation required to confirm that a project has complied with a specific credit, illustrates the interrelationships between the credits and methods to maximize a site’s performance, and identifies additional resources that users may access.^②

2. 华盛顿运河公园总览
3. 华盛顿运河公园中的座椅与植被

2. Overall site view at Washington Canal Park
3. Middle block seating and planting beds at Washington Canal Park

SITES 2.0版评级体系不仅包括可持续景观设计、生态工程、土地规划、生态修复，以及其他相关领域的最佳实践，还结合了通过同行评议后的文献、案例研究和在SITES试点项目中注册的项目所获取的信息。试点项目的参与者们通过实践协助完善体系，引领调整技术内容，简化评分记录要求和使用指南，并明确术语。一些更新的基本要求和评分项（包括促进场地粮食生产的能力）也陆续被引入，而那些已有的意图相似的评分项也得到了整合。

与之前的版本一样，SITES 2.0版亦是针对新的施工建筑或现有场地的重大翻新而设计。评级体系的结构框架一般与典型的项目设计和开发阶段相对应。SITES 2.0版体系的认证级别（认证级、银级、金级和铂金级）亦与LEED的认证级别一一对应，替代了试点项目中所使用的一星至四星认证评级体系。SITES 2.0版重新评估和完善了认证的准入条件（所需满足的基本要求）和4个认证级别，以鼓励更为广泛的参与，同时提高了场地可持续性的标准。评级体系共分为10个部分，包括18个基本标准和48个可选评分项，各个评分项分值的分配，主要基于其各自在实现如表4所述4个目标方面的潜在有效性，这些基本标准和评分项也涵盖了设计与开发过程的各个阶段（表5）。项目首先需满足最低要求（即基本要求），进而针对不同绩效级别获取相应得分，以获得SITES认证。除200分的评分体系之外，项目还可通过创新性和示范性的表现获取附加分。

建立起整合的设计过程和进行全面的场地评估是非常关键的第一步，但在实际的开发项目中往往遭到忽视。为了在整个设计过程及后续的决策中指导项目团队，需建立可衡量的绩效目标。与当地社区尽早展开互动，有助于增强对项目及其周边地区的了解，并确保设计成果满足社区的需求。整个过程从选择合适的场地开始，而后进行设计和施工，最终通过规划有效、适当的运营和维护措施，完成项目目标。涉及“场地设计”的4个部分，详细解释了应当如何解决与水、土壤和植被、材料，以及人类健康和福祉相关的问题。

为了更好地协调设计与施工、维护之间的关系，SITES评级体系要求项目团队在项目初期即与承包商和专业养护人员开展沟通，以便

SITES v2 incorporates best practices in sustainable landscape architecture, ecological engineering, land planning, ecological restoration, and related fields, as well as knowledge gained through peer-reviewed literature, case-study precedents, and projects registered in the SITES pilot program. The experiences of participants in the pilot program helped refine the system, leading to adjustments in technical content, streamlined requirements for documenting achievement of credit requirements, additional guidance, and clearer terminology. Some new prerequisites and credits were also introduced (including a credit for promoting on-site food production) while others with similar intent were combined.

As with the previous version, SITES v2 is directed toward new construction or major renovation of existing sites. The organization of the rating system generally corresponds to the typical project design and development phases. The SITES v2 certification levels (Certified, Silver, Gold, and Platinum) mirror LEED certification nomenclature, and replace the one to four-star recognition used in the pilot program. The entry point for certification (meeting the prerequisites) and the four certification levels were re-evaluated and refined in SITES v2 in order to encourage broad participation while at the same time raising the bar for site sustainability. The rating system includes 18 prerequisites and 48 optional credits in 10 sections. The value or number of points, assigned to each credit is based on its potential effectiveness in meeting the four goals outlined below (Table 4). The prerequisites and credits cover various stages of the design and development process (Table 5). Projects receive SITES certification by fulfilling minimum requirements (i.e., prerequisites) as well as achieving specified numbers of points for different levels of performance. Bonus points are awarded for innovative and exemplary performance outside the 200-point system.

Establishing an integrative design process and conducting a thorough site assessment are critical first steps, yet are often not considered in development projects. Measurable performance goals should be defined to guide the project team throughout the design process and subsequent decisions. Early engagement with the local community can enhance understanding of the project and its surrounding area, and help ensure that the undertaking meets the needs of the community. The process begins with proper site selection, and continues through design and construction, and includes planning for effective and appropriate operations and maintenance measures. Four site design sections explain how to address water, soil and vegetation, materials, and human health and well-being.

To better coordinate design with construction and maintenance, SITES requires project teams to communicate with contractors and maintenance professionals early in the process to

更准确地传达设计意图，实现长期可持续发展的目标。同时，SITES还强烈建议进行适应性管理和绩效监测，以建立积极、有价值的反馈回路，帮助团队理解场地是如何随着时间的推移而发挥功用，并将这些数据收集起来丰富案例，指导可持续景观的打造。

对于包含建筑物的项目，SITES 2.0版可适用于建筑物表皮以外的区域。其不仅涉及景观属性、硬质景观和场地基础设施，在适当情况下也涉及与建筑物的整合。例如，住宅或办公建筑上的绿色屋顶和墙壁，也可被视为项目场地的一部分。评级体系鼓励在建筑物附近策略性地种植适宜的植被，以抵消建筑物采暖与制冷系统的能量负荷；在建筑物的公共空间中（如教室、等候室、起居和用餐区等）提供可供人们接近的植被景观，也有利于改善人类的健康与福祉。在适用和适当的情况下，体系鼓励项目同时申请SITES和LEED认证。一些SITES 2.0版体系的评分项与LEED评分项相一致，方便促进二者的一体化。

inform the design of the project so that long-term sustainability goals can be met. Adaptive management and performance monitoring is strongly encouraged to provide an active and valuable feedback loop for understanding how the site functions over time and as a means to collect data that strengthen the case for creating sustainable landscapes.

For project locations that include buildings, SITES v2 applies to the area from the building skin outward. It addresses the landscape attributes, hardscape, and site infrastructure and, as appropriate, the integration of buildings. For example, a vegetated roof or wall on a building of a residence or office building can be considered as part of a project site. Strategic installation of appropriate vegetation near buildings is encouraged to offset the energy load of a building’s heating and cooling systems; providing unobstructed views of vegetation from common spaces in buildings (e.g., classrooms, waiting rooms, and living and dining areas) is also favored for the documented benefits such access provides to human health and well-being. Projects are encouraged to pursue both SITES and LEED certification where applicable and appropriate. Some SITES v2 credits have been aligned with similar LEED credits to facilitate integration of the two systems.

表4：SITES 2.0版评级体系的目标
Table 4: Goals of the SITES v2 Rating System

1	创建再生系统并培养弹性 Create regenerative systems and foster resiliency	<ul style="list-style-type: none">保护和恢复自然资源，如土壤、水和植被提高生物多样性提升景观以提供多种生态系统服务，如净化空气和水，提供栖息地和固碳等缓解不断演变的危害和自然灾害开展监测和适应性管理计划	<ul style="list-style-type: none">Protect and restore natural resources such as soil, water, and vegetationEncourage biodiversityEnhance landscapes to provide multiple ecosystem services such as cleaning air and water, providing habitat, and storing carbonMitigate evolving hazards and natural disastersPlan for monitoring and adaptive management
2	确保人类未来的资源供给，减缓气候变化 Ensure future resource supply and mitigate climate change	<ul style="list-style-type: none">最大限度地减少能源消耗，鼓励使用低碳和可再生能源最大限度地减少或消除温室气体、重金属、化学品及其他污染物排放材料和资源的减量化、再利用、再循环及升级改造涵养水源通过恢复植被增加场地的碳汇能力	<ul style="list-style-type: none">Minimize energy consumption and encourage use of low carbon and renewable energy sourcesMinimize or eliminate greenhouse gas emissions, heavy metals, chemicals, and other pollutantsReduce, reuse, recycle, and upcycle materials and resourcesConserve waterIncrease the capacity of carbon sinks through re-vegetation
3	通过设计、开发和维护等实践，实现市场转型 Transform the market through design, development, and maintenance practices	<ul style="list-style-type: none">培养行业和专业实践中的领导能力使用系统性思维的、整合的协同设计方法使用生命周期分析来把控设计过程支持当地经济和可持续发展政策	<ul style="list-style-type: none">Foster leadership in industry and professional practiceUse a systems-thinking, integrative, and collaborative design approachUse lifecycle analyses to inform the design processSupport local economies and sustainability policies
4	增进人类福祉并加强社区建设 Enhance human well-being and strengthen community	<ul style="list-style-type: none">重新建立人类与自然之间的关系改善人类健康（生理上和心理上）通过教育促进人们对自然系统的理解，认识景观的价值，从而促进管理鼓励文化完整性和促进区域认同为社区参与和公众倡导提供机会	<ul style="list-style-type: none">Reconnect humans to natureImprove human health (physical, mental, and spiritual)Foster stewardship by providing education that promotes the understanding of natural systems, and recognizes the value of landscapesEncourage cultural integrity and promote regional identityProvide opportunities for community involvement and advocacy

表5-1: SITES 2.0版评分表: 基本要求 (P) 和评分项 (C) (及相应等级)
Table 5-1: SITES v2 Scorecard: List of Prerequisites (P) and Credits (C) (and Associated Point Levels)

1 场地背景 SITE CONTEXT	总 分: Possible points:	13
背景 P1.1 CONTEXT P1.1	限制耕地开发 Limit development on farmland	
背景 P1.2 CONTEXT P1.2	保护洪泛区功能 Protect floodplain functions	
背景 P1.3 CONTEXT P1.3	保护水生生态系统 Conserve aquatic ecosystems	
背景 P1.4 CONTEXT P1.4	保护濒危物种栖息地 Conserve habitats for threatened and endangered species	
背景 C1.5 CONTEXT C1.5	重新开发退化的场地 Redevelop degraded sites	3 ~ 6
背景 C1.6 CONTEXT C1.6	项目开设在已开发区域 Locate projects within existing developed areas	4
背景 C1.7 CONTEXT C1.7	与多模式的交通网络相连 Connect to multi-modal transit networks	2 ~ 3

2 设计前的评估与规划 PRE-DESIGN ASSESSMENT + PLANNING	总 分: Possible points:	3
设计前 P2.1 PRE-DESIGN P2.1	采用综合的设计过程 Use an integrative design process	
设计前 P2.2 PRE-DESIGN P2.2	进行设计前场地评估 Conduct a pre-design site assessment	
设计前 P2.3 PRE-DESIGN P2.3	指定和推行植被与土壤保护区域 Designate and communicate VSPZs	
设计前 C2.4 PRE-DESIGN C2.4	邀请使用者和利益相关者参与 Engage users and stakeholders	3

3 场地设计——水 SITE DESIGN — WATER	总 分: Possible points:	23
水 P3.1 WATER P3.1	管理场地中的降雨量 Manage precipitation on site	
水 P3.2 WATER P3.2	减少景观灌溉用水 Reduce water use for landscape irrigation	
水 C3.3 WATER C3.3	管理超过基线的降雨量 Manage precipitation beyond baseline	4 ~ 6
水 C3.4 WATER C3.4	减少户外用水 Reduce outdoor water use	4 ~ 6
水 C3.5 WATER C3.5	设计功能性雨洪管理设施 Design functional stormwater features as amenities	4 ~ 5
水 C3.6 WATER C3.6	修复水生生态系统 Restore aquatic ecosystems	4 ~ 6

4 场地设计——土壤与植被 SITE DESIGN — SOIL + VEGETATION	总 分: Possible points:	40
土壤与植被 P4.1 SOIL + VEG P4.1	创建和推行土壤管理规划 Create and communicate a soil management plan	
土壤与植被 P4.2 SOIL + VEG P4.2	控制和管理入侵植被 Control and manage invasive plants	
土壤与植被 P4.3 SOIL + VEG P4.3	使用适当的植被 Use appropriate plants	
土壤与植被 C4.4 SOIL + VEG C4.4	保护健康土壤和适当的植被 Conserve healthy soils and appropriate vegetation	4 ~ 6
土壤与植被 C4.5 SOIL + VEG C4.5	保护处于特殊状态的植被 Conserve special status vegetation	4
土壤与植被 C4.6 SOIL + VEG C4.6	保护和使用本土植物 Conserve and use native plants	3 ~ 6
土壤与植被 C4.7 SOIL + VEG C4.7	保护和修复本土植物群落 Conserve and restore native plant communities	4 ~ 6
土壤与植被 C4.8 SOIL + VEG C4.8	最大化生物量 Optimize biomass	1 ~ 6
土壤与植被 C4.9 SOIL + VEG C4.9	减少城市热岛效应影响 Reduce urban heat island effects	4
土壤与植被 C4.10 SOIL + VEG C4.10	使用植被减少建筑能耗 Use vegetation to minimize building energy use	1 ~ 4
土壤与植被 C4.11 SOIL + VEG C4.11	减少灾难性的森林野火 Reduce the risk of catastrophic wildfire	4

5 场地设计——材料选择 SITE DESIGN — MATERIALS SELECTION	总 分: Possible points:	41
材料 P5.1 MATERIALS P5.1	拒绝使用濒危树种和木材 Eliminate the use of wood from threatened tree species	
材料 C5.2 MATERIALS C5.2	维持场地中原有的结构与铺装 Maintain on-site structures and paving	2 ~ 4
材料 C5.3 MATERIALS C5.3	可调节与拆解 Design for adaptability and disassembly	3 ~ 4
材料 C5.4 MATERIALS C5.4	使用再利用的材料与植被 Use salvaged materials and plants	3 ~ 4
材料 C5.5 MATERIALS C5.5	使用可回收的材料 Use recycled content materials	3 ~ 4
材料 C5.6 MATERIALS C5.6	使用当地材料 Use regional materials	3 ~ 5
材料 C5.7 MATERIALS C5.7	支持负责责任的原材料获取 Support responsible extraction of raw materials	1 ~ 5
材料 C5.8 MATERIALS C5.8	支持透明和安全的化学物质使用 Support transparency and safer chemistry	1 ~ 5
材料 C5.9 MATERIALS C5.9	支持材料制造的可持续性 Support sustainability in materials manufacturing	5
材料 C5.10 MATERIALS C5.10	支持种植生产过程中的可持续性 Support sustainability in plant production	1 ~ 5

表5-2: SITES 2.0版评分表: 基本要求 (P) 和评分项 (C) (及相应等级)
Table 5-2: SITES v2 Scorecard: List of Prerequisites (P) and Credits (C) (and Associated Point Levels)

6 场地设计——人类健康与福祉 SITE DESIGN — HUMAN HEALTH + WELL-BEING	总 分: Possible points:	30
人类健康与福祉 C6.1 HHWB C6.1	保护和维持文化与历史场所 Protect and maintain cultural and historic places	2 ~ 3
人类健康与福祉 C6.2 HHWB C6.2	提供适宜的场地通道、安全性及导向系统 Provide optimum site accessibility, safety, and wayfinding	2
人类健康与福祉 C6.3 HHWB C6.3	促进公平的场地使用 Promote equitable site use	2
人类健康与福祉 C6.4 HHWB C6.4	有助于精神恢复 Support mental restoration	2
人类健康与福祉 C6.5 HHWB C6.5	便于开展健身活动 Support physical activity	2
人类健康与福祉 C6.6 HHWB C6.6	可供社交活动 Support social connection	2
人类健康与福祉 C6.7 HHWB C6.7	可供就地粮食生产 Provide on-site food production	3 ~ 4
人类健康与福祉 C6.8 HHWB C6.8	减少光污染 Reduce light pollution	4
人类健康与福祉 C6.9 HHWB C6.9	鼓励节能性与多模式交通 Encourage fuel efficient and multi-modal transportation	4
人类健康与福祉 C6.10 HHWB C6.10	减少接触环境中的烟草烟雾 Minimize exposure to environmental tobacco smoke	1 ~ 2
人类健康与福祉 C6.11 HHWB C6.11	促进当地经济发展 Support local economy	3

7 施工 CONSTRUCTION	总 分: Possible points:	17
施工 P7.1 CONSTRUCTION P7.1	推行可持续的施工过程 Communicate and verify sustainable construction practices	
施工 P7.2 CONSTRUCTION P7.2	控制和滞留施工污染物 Control and retain construction pollutants	
施工 P7.3 CONSTRUCTION P7.3	修复施工过程中被破坏的土壤 Restore soils disturbed during construction	
施工 C7.4 CONSTRUCTION PC.4	修复以往开发过程中被破坏的土壤 Restore soils disturbed by previous development	3 ~ 5
施工 C7.5 CONSTRUCTION PC.5	从清理物中转移施工和废弃材料 Divert construction and demolition materials from disposal	3 ~ 4
施工 C7.6 CONSTRUCTION PC.6	从清理物中转移可重新利用的植被、岩石和土壤 Divert reusable vegetation, rocks, and soils from disposal	3 ~ 4
施工 C7.7 CONSTRUCTION PC.7	在施工过程中保障空气质量 Protect air quality during construction	2 ~ 4

8 实施与维护 OPERATION + MAINTENANCE	总 分: Possible points:	22
实施与维护 P8.1 O+M P8.1	规划可持续性场地维护措施 Plan for sustainable site maintenance	
实施与维护 P8.2 O+M P8.2	可存储与收集可回收物 Provide for storage and collection of recyclables	
实施与维护 C8.3 O+M C8.3	有机物再利用 Recycle organic matter	3 ~ 5
实施与维护 C8.4 O+M C8.4	减少杀虫剂和肥料的使用 Minimize pesticide and fertilizer use	4 ~ 5
实施与维护 C8.5 O+M C8.5	减少户外能量消耗 Reduce outdoor energy consumption	2 ~ 4
实施与维护 C8.6 O+M C8.6	使用可再生能源为景观供电 Use renewable sources for landscape electricity needs	3 ~ 4
实施与维护 C8.7 O+M C8.7	在景观维护过程中保障空气质量 Protect air quality during landscape maintenance	2 ~ 4

9 教育性和绩效监测 EDUCATION + PERFORMANCE MONITORING	总 分: Possible points:	11
教育性 C9.1 EDUCATION C9.1	提高可持续性意识与教育 Promote sustainability awareness and education	3 ~ 4
教育性 C9.2 EDUCATION C9.2	可作为案例研究推行 Develop and communicate a case study	3
教育性 C9.3 EDUCATION C9.3	规划监测和报告场地绩效 Plan to monitor and report site performance	3

10 创新性或示范性表现 INNOVATION OR EXEMPLARY PERFORMANCE	附加分: Bonus points:	9
创新性 C10.1 INNOVATION C10.1	创新性或示范性表现 Innovation or exemplary performance	3 ~ 9

总计 : 200
Total Possible Points:

SITES认证级别 SITES certification levels	得分 Points
认证级 CERTIFIED	70
银级 SILVER	85
金级 GOLD	100
铂金级 PLATINUM	135

SITES 2.0版评级体系不仅采纳了来自试点项目的建议，且充分回应了公众对于之前版本的评级体系的意见，并结合了技术顾问和工作人员的其他研究和建议。此外，在设计者的设想中，SITES 2.0版是一个具有生命力的产品，它将随着时间的推移、随着新的研究和体系使用经验的积累而不断发展演进。

7 SITES 2.0版的未来发展和应用

为了确保地球的生态安全，我们亟须改进传统土地开发方法。城镇化、土地退化和气候变化所带来的影响已不可忽视。SITES旨在通过为户外环境——特别是在城市地区——的设计制定新的标准、研发新的工具，以提升健康景观的价值。SITES的这种基于生态系统的规划和设计方法，适用于任何规模或环境，其指导项目中场地的开发方向由单一功能转换为多功能，使场地能够抵消不良设计造成的有害影响，并减少社区的洪泛、火灾及其他极端天气的隐患。此外，它还能够提供经济效益、集约资源、恢复野生动物栖息地，同时打造可持续设计的公园、步道及其他城市绿地，以提高社区公民和游客的生活和体验质量。对于不适于获取SITES 2.0版认证的规划和设计项目来说，仍可采用SITES的一般原则来解决具体问题，并提高其设计成果的绩效和弹性。

随着SITES在应用程度、适用范围和影响力等方面的不断扩展，对其更为深入的研究和评估将不断增多。未来研究的重要领域可能包括：

1）识别和确定SITES在应用中的常见障碍，并探索将之减少或消除的方法。

2）探索将SITES与市政规划、开发指令和规范相结合的可能性。随着SITES应用的推广，应调查市政当局及其他公共实体对其的应用情况并鼓励他们应用这一系统。

3）找到准确、有效的方法来计算指定项目所提供的生态系统服务的经济、生态和社会效益。SITES 2.0版评级体系中有关鼓励绩效监测和报告的得分项，将有助于建立这套知识体系。此外，景观设计基金会已开始编制能够展示可持续设计项目的可量化价值的案例研究。随

The SITES v2 Rating System responded to advice received from pilot projects, public comments on previous versions of the rating system, as well as incorporated additional research and recommendations from technical advisors and staff. Still, SITES v2 is envisioned as a living product that will evolve over time with new research and experience in applying the system.

7 Future Evolution and Application of SITES v2

The need to change conventional approaches to land development is becoming more acute to ensure the ecological security of our planet. The impact of urbanization, land degradation, and climate change can no longer be ignored. The SITES program set out to elevate the value of healthy landscapes by creating a new standard and tool for the design of outdoor environments, especially in urban areas. Adopted at any scale or context, this ecosystem-based planning and design approach embodied in SITES can guide development to moving from single function sites to providing multiple functions offsetting the harmful impacts of poorly designed development and reducing a community’s vulnerability to floods, fire, and other extreme weather events. In addition, it can provide economic benefits, conserve resources, restore wildlife habitat, while creating sustainably designed parks, trails, and other urban green spaces that enhance the quality of life for a community’s citizens and visitors. Those who plan and design projects for which SITES v2 certification is not possible or appropriate can still apply the general SITES principles to address specific problems and improve the performance and resilience of their undertakings.

Opportunities for continuing research and evaluation will become apparent as SITES expands in application, scope, and impact. Some important areas for future investigation will likely include:

1) Identifying and addressing common barriers to adoption of SITES and finding ways to reduce or eliminate them.

2) Exploring the potential for integrating SITES with municipal planning and development directives and codes. As SITES becomes more visible, its application by municipalities and other public entities should be investigated and encouraged.

3) Finding accurate and effective ways to calculate for a given project the economic, ecological, and social benefits of the ecosystem services it provides. The related SITES v2 credit that encourages performance monitoring and reporting will assist in building this knowledge. In addition, the Landscape Architecture Foundation has begun compiling case studies that demonstrate the measureable value of sustainably designed projects.

着此类信息不断进入景观设计从业者及其客户的视野，人们将SITES体系纳入项目开发的兴趣也会愈发浓厚。

4）检验SITES向其他国家和文化转移的潜力。

SITES以如下观念为基础而开发：自然已经以各种方式提供了对人类和社区有益的基本功能。无论项目的地理位置、气候或预期用途为何，SITES评级体系的所有基本要求和评分项，均旨在保护或恢复生态系统服务。该体系已在城市和郊区的各种项目类型，以及退化土地（即棕地和灰地）的重建中都取得了成功。通过在场地开发中采用这套方法，一座城市将可以逐渐构建高性能、高弹性的景观网络，以解决当地和区域所面临的挑战，建立人类与自然之间的必要联系，并为其他积极的改变创造机会。

SITES最终能否成功取决于项目委托方、土地所有者、开发商、政府官员、景观设计师、规划师、城市设计师、工程师、承建方和公众对其接受和采纳的程度。对于可持续景观的价值，以及将其与建筑、基础设施等相结合的益处，上述的从业者和利益相关者们将拥有绝对的发言权。他们的经验将有助于推动SITES在未来的改进和应用，实现人们创造兼具美感、功能性和弹性的场所的共同目标。**LAF**

致谢

感谢SITES委员会成员、技术顾问和试点项目的参与者们，他们对场地可持续性设计行动计划和SITES 2.0版评级体系的发展做出了卓越贡献。感谢美国植物园的大力支持和GBCI的持续管理，使得SITES从概念变为现实。

Interest in incorporating SITES in the project development will likely expand as this kind of information becomes available to practitioners and their clients.

4) Examining the potential transfer and adaptation of SITES to other nations and cultures.

SITES is based on the notion that nature already provides essential functions that benefit people and communities in a variety of ways. Every SITES prerequisite and credit is designed to protect or restore ecosystem services, regardless of a project’s location, climate, or intended use. It has worked successfully for various project types in urban and suburban areas as well as for redevelopment of degraded sites (i.e., brownfields and greyfields). With this approach to site development, cumulatively a city can assemble a network of high performing, resilient landscapes that can address local and regional challenges, provide needed access to nature, and optimize additional opportunities for positive change.

Ultimately, the success of the SITES program will be determined by the extent to which it is embraced by clients, landowners, developers, government officials, landscape architects, planners, urban designers, engineers, builders, and ordinary citizens. They will provide the strongest and most effective voice for the value of sustainable landscapes and the benefits of integrating it with building and infrastructure design. Their experiences will help drive the future refinements and application of SITES for the shared goal of creating beautiful, functional, and resilient places. **LAF**

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REFERENCES

[1] Forman, R. T. T., & Wu, J. G. (2016). Where to Put the Next Billion People. <i>Nature</i> , 537(7622), 608-611.	and Ecological Concepts for Valuing Ecosystem Services. <i>Ecological Economics</i> , 14(3), 375-392.	[11] Fiksel, J. (2006). Sustainability and Resilience: Toward a Systems Approach. <i>Sustainability: Science, Practice, & Policy</i> , 2(2), 14-21.
[2] Lady Bird Johnson Wildflower Center, The University of Texas at Austin, & United States Botanic Garden: and American Society of Landscape Architects. (2014). SITES v2 Reference Guide: For Sustainable Land Design and Development. Austin: Sustainable SITES Initiative.	[7] Windhager, S., Steiner, F., Simmons, M. T., & Heymann, D. (2010). Toward Ecosystem Services as a Basis for Design. <i>Landscape Journal</i> , 29(2), 107-123.	[12] American Society of Landscape Architects, Lady Bird Johnson Wildflower Center, The University of Texas at Austin, & U.S. Botanic Garden. (2007). Preliminary Report of the Standards and Guidelines, The Sustainable SITES Initiative. Austin: Sustainable SITES Initiative.
[3] McHarg, I. L. (1969). <i>Design with Nature</i> . New York: Natural History Press.	[8] Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S. J., Kubiszewski, I., Farber, S., & Turner, R. K. (2014). Changes in the Global Value of Ecosystem Services. <i>Global Environmental Change</i> , 26, 152-158.	[13] American Society of Landscape Architects, Lady Bird Johnson Wildflower Center, The University of Texas at Austin, & United States Botanic Garden. (2008). Guidelines and Performance Benchmarks, Draft 2008. Austin: Sustainable SITES Initiative.
[4] Lyle, J. T. (1994). <i>Regenerative Design for Sustainable Development</i> . New York: John Wiley & Sons.	[9] Birch, E. L., & Wachter, S. M. (Eds.) (2008). <i>Growing Greener Cities: Urban Sustainability in the Twenty-First Century</i> . Philadelphia: University of Pennsylvania Press.	[14] American Society of Landscape Architects, Lady Bird Johnson Wildflower Center, The University of Texas at Austin, & United States Botanic Garden. (2009). Guidelines and Performance Benchmarks 2009. Austin: Sustainable SITES Initiative.
[5] Costanza, R. (2008). Ecosystems Services: Multiple Classification Systems Are Needed. <i>Biological Conservation</i> , 141(2), 350-352.	[10] Hirsch, D. D. (2008). Ecosystem Services and the Green City. In E. L. Birch & S. M. Wachter (Eds.), <i>Growing Greener Cities</i> (pp. 281-293).	
[6] Farber, S. C., Costanza, R., & Wilson, M. A. (2002). Economic		