5 Site Sustainability

SYNOPSIS

Chapter 5 Site Sustainability. Chapter 5 contains provisions for site selection and development, and the mitigation of heat island effect, light pollution, construction site debris and transportation impacts.

As in the previous code edition, jurisdictional options (JOs) are included to provide flexibility and adaptability for a jurisdiction to adopt the code or portion of the code in a manner that is best suited for the environmental priorities of their jurisdiction. JOs for site sustainability include mitigation of heat island effect on walls, reduction of light pollution, bicycle parking location, parking racks, bicycle security and site waste landfill diversion. The informative symbol [JO] indicates jurisdictional option.

Section 501.3.1.1 (§ 5.3.1) limits the scope of new building projects to existing building infrastructure and previously developed sites including brownfields, greyfields and greenfields. Development on greenfields is limited to sites located in walkable proximity to neighborhood services or public transit. Development on agricultural, forest or park land is permitted as long as the proposed building project is related to the intended function of the agricultural, forest or park land.

Section 501.3.1.2 (§ 5.3.1.2) prohibits development on previously undeveloped sites having an elevation lower than 5 feet (1.5 m) above the elevation of the 100-year flood and lands in close proximity to wetlands and to fish and wildlife habitat conservation area.

Section 501.3.2 (§ 5.3.2) requires predesign site inventory and assessment.

Section 501.3.3 (§ 5.3.3) prohibits invasive plants and protects native plants on greenfields.

Section 501.3.4 (§ 5.3.4) contains requirements for stormwater management systems.

Section 501.3.5 (§ 5.3.5) requires the mitigation of heat island effect on hardscape surfaces and roofs. Mitigation of wall surfaces is regulated by ANSI/ASHRAE/IES Standard 90.1.

Section 501.3.6 (§ 5.3.6) provides mitigation of site light pollution as a jurisdictional option.

Section 501.3.7 (§ 5.3.7) addresses transportation impacts, including requirements for pedestrian connectivity, bicycle parking and electric vehicle charging facilities. Bicycle parking location, rack design and security/visibility provisions are jurisdictional options.

Section 501.3.8.1 (§ 5.3.8.1) provides building site waste management as a jurisdictional option based on percentage of landfill diversion.

Changes to Site Sustainability

- ❑ **Building project and site.** Addendum d revises the definition of "building project" and removes the definition of "site." The addendum changes every instance of "site" in the code to a non-defined term and revises the provisions, where needed, into the context of its use of the term. Removing the definition adds flexibility, thereby allowing "site" to be used in the context of the requirements. This change is also in better alignment with other building codes in the context of using the term "site."

- ❑ **501.3.1.2 (§ 5.3.1.2) Flood hazard area.** Addendum an addresses the resilience of essential buildings that are defined as Risk Category IV structures by the *International Building Code*® (IBC®). This addendum prohibits construction of such buildings in a 500-year flood hazard area when selected as a jurisdictional option (JO). As the extent and frequency of flood events continues to expand, this provision ensures resilient essential facilities for the communities they serve. This addendum revises flood-zone terminology to be compatible with both US and international applications. Finally, this change removes an exception for "AO" flood zones, because this single exception is inconsistent with comparable flood zones.

- ❑ **501.3.3.1 (§ 5.3.3.1) Invasive plants.** Invasive species are a leading contributor to the decline of biodiversity and the ecosystems on which human life depends. Landscape architects and builders have an important role to play in reducing the spread of invasive species by avoiding their use as ornamental plants on newly developed properties. However, the IgCC invasive plant restrictions were determined to be too stringent for enforcement. Addendum f improves the practicality of enforcement. It provides informative references to assist authorities having jurisdiction in identifying regional invasive plant lists or to develop one of their own. In recognition of invasive plants' harm to the environment, the risks that they cause to human health, and the expenditures of efforts to control them, states and localities are increasingly enacting legislation and ordinances to reduce the sale or use of invasive plants that are commonly available in local communities.

- ❑ **501.3.3.2 (§ 5.3.3.2) Greenfields.** Greenfield sites are a particular concern for green building, as wildlife habitat loss is a worldwide concern. Addendum aq revises the definition of native plants and requirements for maintaining native plants on the site. The addendum also provides options for compliance thereby providing flexibility to the design and construction team, including an option to use nonnative plantings that provide similar value to the local food web as native plants. These requirements replace existing requirements that were confusing and open to interpretation.

- ❑ **501.3.3.3 (§ 5.3.3.3) Plant resiliency.** As the impacts of climate change begin to appear at the local level, some plants are becoming difficult to use in some regions. Therefore, this change avoids the use of plants that are unlikely to thrive or even survive. Trees provide a multitude of benefits, including cooling from shade and evapotranspiration, serving as habitats for birds and other wildlife, improving air quality, etc. Trees are also particularly vulnerable to climate change, as they're more likely to encounter environments that differ significantly from those in which they were planted, due to their longer lifespans. As a jurisdictional option (JO), this change is applicable in communities that have identified regional plants for their resiliency.

- ❑ **501.3.5.2 (§ 5.3.5.2) Walls.** Addendum j deletes the Jurisdictional Option (JO) provisions in Standard 189.1 and adds a mandatory requirement to follow the requirements set forth in ANSI/ASHRAE/IES Standard 90.1. Published Addendum s to Standard 90.1-2022 made several technical improvements in the requirements for cool walls. This change removes the term "solar reflectance index" (SRI) for walls and replaces it with the more accurate term "solar reflectance" (SR) and the corresponding ASTM test methods. It deletes the option for vegetation to provide shading, recognizing that plants are not durable and unlikely to last the life of the building, The change also modifies the affected climate zone to 0 where solar reflectance is most effective.

- ❑ **501.3.5.3 (§ 5.3.5.3) Roofs.** Addendum r revises Section 5.3.5.3 to align with industry standards for defining low-slope roofs to be less than a 2:12 slope.

- ❑ **501.3.7.3 (§ 5.3.7.3) EV charging.** Addendum q provides format changes that separate residential EV charging requirements from nonresidential requirements. The addendum also updates the definitions of "electric vehicle supply equipment (EVSE)" and "EV ready space," and adds a new definition for "electric vehicle supply equipment installed space (EVSE space)." Addendum af expands the scope of the provisions by applying to all parking areas with four or more parking spaces. A new definition has been added for "EV capable space." The addendum also requires not less than 30 percent of the total number of nonresidential parking spaces and 75 percent of the total residential parking spaces to be EV capable spaces, EV ready spaces, or EVSE spaces.

These changes are designated with a ❖ in the margin of this chapter. For the specific addenda that define the differences between the 2020 and 2023 editions of ASHRAE Standard 189.1/2024 IgCC, refer to Informative Appendix N of the IgCC.

Scope 501.1 (§ 5.1)

The site sustainability measures in the IgCC are intended to reduce the environmental impacts associated with the construction and use of a building project *site*. For example, building on a *greenfield* or previously undeveloped *site* often disrupts habitats and ecosystems while compounding the negative effects of erosion. Similarly, *hardscape* on a building *site* affects stormwater runoff and can increase the *heat island effect,* depending on shade, color, reflectivity and the emissivity of hardscape surfaces.

The selection of a building *site* also affects air emissions, including carbon dioxide. Building occupants frequently rely on automobiles to travel to and from buildings. If a *building* is located in close proximity to an existing *residential* community, neighborhood services or public transit, individuals are more inclined to use alternative modes of transportation, such as walking and bicycling, thereby mitigating greenhouse gas emissions and other pollutants emitted from passenger vehicles.

Light pollution is another environmental impact associated with *site* lighting. Exterior lighting can disrupt the nocturnal habitats of wildlife and reduce visual access to night skies. Additionally, excessive and improperly shielded lighting can travel beyond the building property line, disturbing adjacent properties with glare or blinding light.

By evaluating *site*-related criteria early in the design process, projects can reduce the environmental impacts associated with *site* selection, *stormwater*, *heat islands*, light pollution, transportation and site debris.

Chapter 5 does not include the prescriptive or performance paths found frequently in other chapters. Figure 5-A provides a graphical representation of the compliance requirements for Chapter 5, Site Sustainability.

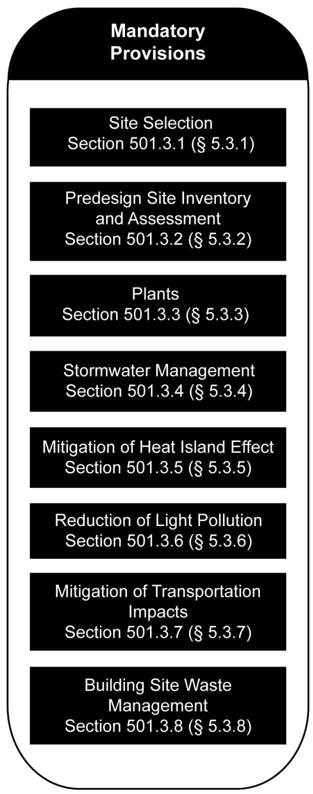

Figure 5-A Compliance paths.

Reserved 501.2 (§ 5.2)

Mandatory Provisions 501.3 (§ 5.3)

The *site*-related provisions are mandatory for all projects except for those provisions identified as a jurisdictional option (JO). These mandatory provisions ensure that all critical *site*-related features are addressed. The mandatory provisions cover the following topics: *site* selection, Section 501.3.1 (§ 5.3.1); predesign *site* inventory and assessment, Section 501.3.2 (§ 5.3.2); *plants,* Section 501.3.3 (§ 5.3.3.); stormwater management, Section 501.3.4 (§ 5.3.4); mitigation of *heat island effect,* Section 501.3.5 (§ 5.3.5); reduction of light pollution, Section 501.3.6 (§ 5.3.6); mitigation of transportation impacts, Section 501.3.7 (§ 5.3.7); and building site waste management, Section 501.3.8 (§ 5.3.8).

Site Selection 501.3.1 (§ 5.3.1)

This section provides criteria related to *site* selection and limits the impact of development on environmentally sensitive lands.

Allowable Sites 501.3.1.1 (§ 5.3.1.1)

As a measure to preserve open *space*, greenfields and the ecological functions that natural ecosystems provide, the IgCC establishes low impact development (LID) measures intended to enhance the environmental quality of development within any given community. However, users of the code will need to interface and comply with local planning and zoning regulations pertaining to land use, mixed-use, setbacks and dwelling unit density. In addition to such regulations, the IgCC encourages low-impact development in the following areas:

a. Existing building and sites. Reuse of and reinvestment in existing building infrastructure can be one of the most sustainable choices for a building project. Reuse includes existing parking lots, walkways and stormwater management infrastructure.
b. The IgCC encourages development on *brownfields*. A brownfield as defined in Chapter 3 is a site documented as contaminated by means of an ASTM E1903 Phase II Environmental Site Assessment or a site is classified as a *brownfield* by a local, state, or federal government agency. *Brownfields* are often found in developed urban areas and can be cleaned and remediated into a safe habitable environment.
c. The IgCC encourages development on *greyfields*. A *greyfield* as defined in Chapter 3 is a site of which more than 20 percent is currently or has been previously developed with impervious surfaces. Examples of a *greyfield* include an abandoned parking lot or an underutilized real estate asset such as an aging retail mall or other commercial development.
d. A greenfield, as defined in Chapter 3 is a site of which 20 percent or less has been previously developed with impervious surfaces. The IgCC limits development on *greenfields* except where the *greenfield* is not *agricultural land or forestland* and located within $^1/_2$ mile (800 m) of *residential* development or that has one or more buildings under construction with an average density of 10 *dwelling units* per acre (4 units per ha). Proximity is determined by drawing a circle with a $^1/_2$ mile (800 m) radius around the center of the proposed site.
    i The IgCC permits development on greenfields where the proposed building complies with ASTM E2843, *Standard Specification for Demonstrating that a Building is in Walkable Proximity to Neighborhood Assets*, with the exception of *agricultural* or forest lands. By selecting a site in walkable proximity to wide range of neighborhood assets such as grocery stores, day-care facilities, dry cleaners, beauty shops, hardware stores, financial institutions, post offices and restaurants, building users will be less dependent on vehicles, thereby helping to mitigate greenhouse gas emissions and other environmental impacts. To determine whether a *site* meets this requirement, project teams are encouraged to create a scaled map showing the distance from the project *site* to surrounding neighborhood assets. A useful example of a basic services map, illustrating community connectivity, is provided in Figure 5-B.
    ii The IgCC also permits development on greenfields where the proposed building complies with ASTM E2844, *Standard Specification for Demonstrating that a Building's Location Provides Access to Public Transit*. By selecting a site with access to alternative or public transit, building users will again be less dependent on vehicles to access neighborhood services, thereby helping to mitigate greenhouse gas emissions and other environmental factors. To determine whether a potential site meets this requirement, projects should create a scaled map showing the location of the project site in relation to the surrounding public transit. A useful sample drawing for this type of transit map is shown in Figure 5-C.

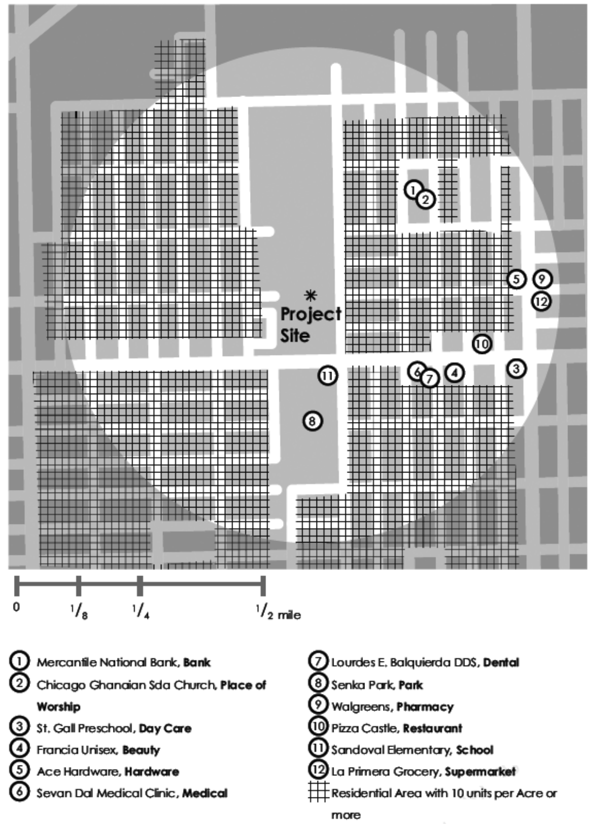

Figure 5-B Sample map of community connectivity.
Source: *LEED Reference Guide for Green Building Design and Construction*, 2009 Edition, Sustainable Sites Credit 2: Development Density and Community Connectivity

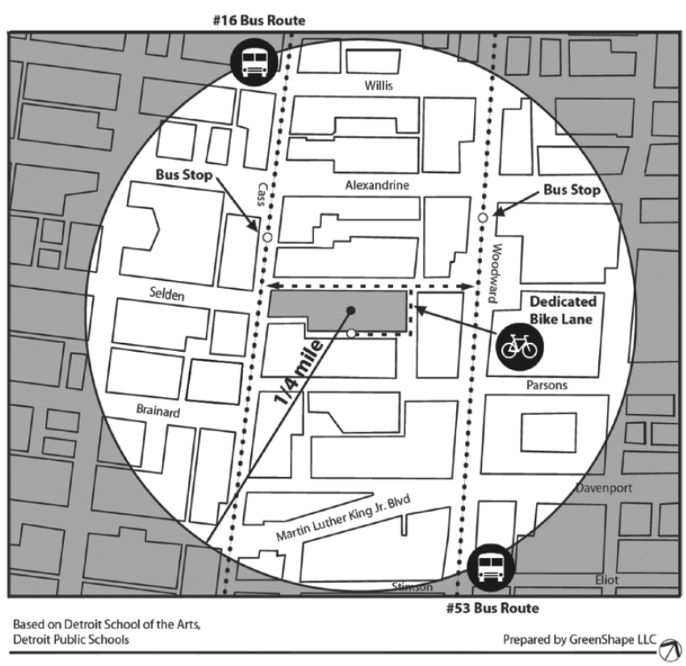

Figure 5-C Sample map of community connectivity.
Source: *LEED Reference Guide for Green Building Design and Construction*, 2009 Edition, Sustainable Sites Credit 4.1: Alternative Transportation—Public Transportation Access

e. Development on *agricultural lands* is limited to building projects whose function is related to agriculture. The intent of this requirement is to promote local agricultural trade and production by reserving lands with suitable soil, water properties, etc., for projects dependent on these characteristics.[1]

f. Development on *forest land* is limited to *building projects* whose function is related to the forest. The intent of this requirement is to prohibit development that leads to deforestation, which has a direct impact on wildlife habitat, biodiversity, carbon sequestration, erosion and other environmental conditions. An example of a building appropriately located on *forest land* might include a ranger station, visitor center or forestry service building located within a national forest.

g. Development on designated *park land* is limited to *building projects* whose function is related to the park. Examples of buildings on *designated park land* might include an administration building servicing a national or regional park, a visitors' center or a recreational facility located within a municipal public park.

Prohibited Development Activity 501.3.1.2 (§ 5.3.1.2)

In order to protect environmentally sensitive lands from development, there shall be no *site* disturbance or development of the following:

a. (JO) Category IV *building projects* as defined by the *International Building Code*, on land located within a 0.2 percent annual chance flood hazard area.

b. Previously undeveloped land having an elevation lower than 5 feet (1.5 m) above the elevation corresponding to a 1 percent annual chance flood. The intent of this requirement is to minimize the risk of *site*-related hazards, such as flooding, that may result from naturally occurring storm events.

Exception to 501.3.1.2(b) [§ 5.3.1.2(b)]

The exception applies to *low-impact trails* anywhere within a flood zone. *Low-impact trails* are pathways or tracks intended for pedestrian and nonmotorized vehicles. They must be erosion-stabilized and use permeable or natural ground cover. Although some damage to *low-impact trails* may occur during a flood, trails do not significantly impede water flow or infiltration.

c. Land within 150 feet (50 m) of any *fish and wildlife habitat conservation area* is prohibited from development activity. These areas are designated at the state or federal level as areas that support the needs of endangered, threatened or sensitive *plant* or animal species.

Exceptions to Section 501.3.1.2(c) [§ 5.3.1.2(c)]

1. Development of *low-impact trails* that are at least 15 feet (4.5 m) from the habitat conservation areas. Such trails as defined cause minimal disturbance to the surrounding environment.
2. Site disturbance or development is allowed for activity associated with habitat enhancement measures or restoration of habitat.

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1. Additional information on designated agricultural lands can be found in CFR Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7 CFR 657.5) (http://www.ecfr.gov).