



**LEED v4 for Neighborhood Development Plan  
Project Checklist**

Project Name: Government Housing Community Project, Logan Utah  
Date: 3/4/2020

Yes	?	No			
22	0	6	<b>Smart Location &amp; Linkage</b>		<b>28</b>
Y			Prereq	Smart Location	Required
Y			Prereq	Imperiled Species and Ecological Communities	Required
Y			Prereq	Wetland and Water Body Conservation	Required
Y			Prereq	Agricultural Land Conservation	Required
Y			Prereq	Floodplain Avoidance	Required
10			Credit	Preferred Locations	10
		2	Credit	Brownfield Remediation	2
5		2	Credit	Access to Quality Transit	7
1		1	Credit	Bicycle Facilities	2
3			Credit	Housing and Jobs Proximity	3
		1	Credit	Steep Slope Protection	1
1			Credit	Site Design for Habitat or Wetland and Water Body Conservation	1
1			Credit	Restoration of Habitat or Wetlands and Water Bodies	1
1			Credit	Long-Term Conservation Management of Habitat or Wetlands and Water Bodies	1

Yes	?	No			
28	0	13	<b>Neighborhood Pattern &amp; Design</b>		<b>41</b>
Y			Prereq	Walkable Streets	Required
Y			Prereq	Compact Development	Required
Y			Prereq	Connected and Open Community	Required
4		5	Credit	Walkable Streets	9
1		5	Credit	Compact Development	6
4			Credit	Mixed-Use Neighborhoods	4
7			Credit	Housing Types and Affordability	7
		1	Credit	Reduced Parking Footprint	1
2			Credit	Connected and Open Community	2
1			Credit	Transit Facilities	1
1		1	Credit	Transportation Demand Management	2
1			Credit	Access to Civic & Public Space	1
		1	Credit	Access to Recreation Facilities	1
1			Credit	Visitability and Universal Design	1
2			Credit	Community Outreach and Involvement	2
1			Credit	Local Food Production	1
2			Credit	Tree-Lined and Shaded Streetscapes	2
1			Credit	Neighborhood Schools	1

Yes	?	No			
25	0	6	<b>Green Infrastructure &amp; Buildings</b>		<b>31</b>
Y			Prereq	Certified Green Building	Required
Y			Prereq	Minimum Building Energy Performance	Required
Y			Prereq	Indoor Water Use Reduction	Required
Y			Prereq	Construction Activity Pollution Prevention	Required
5			Credit	Certified Green Buildings	5
2			Credit	Optimize Building Energy Performance	2
1			Credit	Indoor Water Use Reduction	1
2			Credit	Outdoor Water Use Reduction	2
		1	Credit	Building Reuse	1
		2	Credit	Historic Resource Preservation and Adaptive Reuse	2
1			Credit	Minimized Site Disturbance	1
3		1	Credit	Rainwater Management	4
1			Credit	Heat Island Reduction	1
1			Credit	Solar Orientation	1
3			Credit	Renewable Energy Production	3
2			Credit	District Heating and Cooling	2
1			Credit	Infrastructure Energy Efficiency	1
		2	Credit	Wastewater Management	2
1			Credit	Recycled and Reused Infrastructure	1
1			Credit	Solid Waste Management	1
1			Credit	Light Pollution Reduction	1

Yes	?	No			
6	0	0	<b>Innovation &amp; Design Process</b>		<b>6</b>
5			Credit	Innovation	5
1			Credit	LEED® Accredited Professional	1

Yes	?	No			
0	0	4	<b>Regional Priority Credits</b>		<b>4</b>
		1	Credit	Regional Priority Credit: Region Defined	1
		1	Credit	Regional Priority Credit: Region Defined	1
		1	Credit	Regional Priority Credit: Region Defined	1
		1	Credit	Regional Priority Credit: Region Defined	1

Yes	?	No	<b>PROJECT TOTALS (Certification estimates)</b>		<b>110</b>
81	0	29			

Certified: 40-49 points, Silver: 50-59 points, Gold: 60-79 points, Platinum: 80+ points

**LEED**  
**V4 for Neighborhood**  
**Development Plan**

**Proposed Credits**  
**Project List**

## **Smart Location & Linkage**

### **Smart Location Required**

Either (1) locate the project on a site served by existing water and wastewater infrastructure or (2) locate the project within a legally adopted, publicly owned, planned water and wastewater service area, and provide new water and wastewater infrastructure for the project. The site should also meet the requirements of one of the following four options.

Locate the project on an infill site.

### **Imperiled Species and Ecological Communities Required**

Consult with the state Natural Heritage Program and state fish and wildlife agencies (or local equivalent for projects outside the U.S.) to determine if any of the following have been or are likely to be found on the project site because of the presence of suitable habitat and nearby occurrences:

- species listed as threatened or endangered under the U.S. Endangered Species Act or the state's endangered species act, or
- species or ecological communities classified by NatureServe as GH (possibly extinct), G1 (critically imperiled), or G2 (imperiled), or
- species listed as threatened or endangered specified under local equivalent standards (in areas outside the U.S.) that are not covered by NatureServe data.

If the consultations are inconclusive and site conditions indicate that imperiled species or ecological communities could be present, perform biological surveys using accepted methodologies during appropriate seasons to determine whether such species or communities occur or are likely to occur on the site. Comply with the appropriate case or option below.

The prerequisite is satisfied if the consultation and any necessary biological surveys determine that no such imperiled species or ecological communities have been found or have a high likelihood of occurring.

## **Wetland and Water Body Conservation Required**

Limit development effects on wetlands, water bodies, and surrounding buffer land according to the requirements below.

Case 1. Sites without Sensitive Areas

Locate the project on a site that includes no preproject wetlands, water bodies, land within 50 feet (15 meters) of wetlands, and land within 100 feet (30 meters) of water bodies.

## **Agricultural Land Conservation Required**

Locate the project on a site that is not within a state or locally designated agricultural preservation district (or local equivalent for projects outside the U.S.), unless any changes made to the site conform to the requirements for development within the district (as used in this requirement, "district" does not equate to land-use zoning). Meet the requirements of one of the following five options.

Locate the project on an infill site

## **Floodplain Avoidance Required**

Locate the project on an infill site or a previously developed site and select one of the following two options.

For any portion of the site within the flood hazard area, design buildings in accordance with American Society of Civil Engineers Standard 24-05 (ASCE 24). If the project includes construction of a critical facility that is intended to remain operational in the event of a flood, or whose function is critical for postflood recovery, design the facility to be protected and operable at the floodwater levels specified in ASCE 24, or at the water levels represented by a 0.2% annual chance (500-year) flood, whichever is higher. For the purpose of this requirement, critical facilities include, but are not limited to, hospitals, emergency operations centers, building or portions of buildings designated as emergency shelters, water and sewage treatment facilities, and fire and police stations.

**Preferred Locations**  
**10 Points**

Achieve any combination of requirements in the following three options:

An infill site that is also a previously developed site (5 points).

Locate the project in an area that has existing connectivity, as listed in Table 1.

Measure connectivity one of two ways:

- within 1/2 mile (800 meters) of the project boundary; or
- within the project and within 1/2 mile (800 meters) of the project boundary.

Intersections within the site may be counted if the intersections were not constructed or funded by the developer within the past ten years. Table 1. Points for connectivity within 1/2 mile of project

Intersections per square mile	Intersections per square kilometer	Points
200-249	78-96	1
250-299	97-115	2
300-349	116-134	3
350-399	135-153	4
400 or more	≥ 154	5

**Access to Quality Transit**  
**5 Points**

Weekday trips	Weekend trips	Points
60	40	1
76	50	2
100	65	3
132	85	4
180	130	5
246	150	6
320	200	7

Locate the project on a site with existing transit service such that at least 50% of dwelling units and nonresidential use entrances (inclusive of existing buildings) are within a ¼-mile (400-meter) walking distance of bus, streetcar, or rideshare stops or within a ½-mile (800-meter) walking distance of bus rapid transit stops, light or heavy rail stations, commuter rail stations or ferry terminals, and the transit service at those stops in aggregate meets the minimums listed in Tables 1 and 2. Projects must meet the requirements for both weekday and weekend trips and provide service every day.

**Bicycle Facilities**  
**1Point**

Short-term bicycle storage must be within 100 feet (30 meters) walking distance of any main entrance. Long-term bicycle storage must be within 100 feet (30 meters) walking distance of any functional entry. It must be easily accessible to all building users. Shower and changing facility requirements may be met by providing the equivalent of free access to on-site health club shower facilities, if the health club can be accessed

without going outside. Additionally, meet the requirements of at least one of the following two options.

Design the project such that at least 50% of dwelling units and nonresidential use entrances are located on an existing or planned bicycle network extending at least three continuous miles (4800 meters). Within those three miles (4800 meters), the network must connect to one of the following:

- a school;
- an employment center

### **Housing and Jobs Proximity 3 Points**

Include a residential component equaling at least 30% of the project's total building floor area (exclusive of parking structures), and locate or design the project such that its geographic center (or boundary if the project exceeds 500 acres [200 hectares]) is within a ½-mile (800-meter) walking distance of existing full-time equivalent jobs whose number equals or exceeds the number of dwelling units in the project. Satisfy the requirements necessary to earn at least 1 point under NPDC4 Housing Types and Affordability, Option 2, Affordable Housing.

### **Site Design for Habitat or Wetland and Water Body Conservation 1 Point**

Locate the project on a site that does not have significant habitat, as defined in Case 2 of this credit, and is not within 100 feet (30 meters) of such habitat. Fulfill the requirements of Option 1 or 2(a) under SLL Prerequisite Wetland and Water Body Conservation.

### **Restoration of Habitat or Wetlands and Water Bodies Point 1**

Using only native plants, restore predevelopment native ecological communities, water bodies, or wetlands on the project site in an area equal to or greater than 10% of the development footprint. Work with a qualified biologist to ensure that restored areas will have the native species assemblages, hydrology, and other habitat characteristics that likely occurred in predevelopment conditions. Protect such areas from development by donating or selling the land, or a conservation easement on the land, to an accredited

land trust, conservation organization, or relevant government agency (a deed covenant is not sufficient to meet this requirement) for the purpose of long-term conservation. Identify and commit to ongoing management activities, along with parties responsible for management and funding available, so that restored areas are maintained for a minimum of three years after the project is built out or the restoration is completed, whichever is later. The requirement for identifying ongoing management activities may also be met by earning [SLL Credit Long-Term Conservation Management of Habitat or Wetland and Water Bodies](#). . The project does not meet the requirements if it has negative effects on habitat for species identified in endangered species acts or habitat flagged for conservation in Option 1 of [SLL Credit Site Design for Habitat or Wetland and Water Body Conservation](#).

### **Long-Term Conservation Management of Habitat or Wetlands and Water Bodies 1 Point**

Create and commit to implementing a long-term (at least 10-year) management plan for existing or recently restored on-site native habitats, water bodies, or wetlands and their buffers, and create a guaranteed funding source for management. Involve a qualified biologist or a professional from a natural resources agency or natural resources consulting firm in writing the management plan and conducting or evaluating the ongoing management. The plan must include biological objectives consistent with habitat or water resource conservation, and it must identify the following:

- procedures and personnel for maintaining the conservation areas;
- estimated implementation costs and funding sources; and
- any threats that the project poses for habitat or water resources within conservation areas (e.g., introduction of exotic species, intrusion of residents in habitat areas) and measures to substantially reduce those threats.

The project does not meet the requirements if it has negative effects on habitat for species identified in endangered species acts or habitat flagged for conservation in Option 1 of SLL Credit Site Design for Habitat or Wetland and Water Body Conservation.



## Neighborhood Pattern & Design

### Walkable Streets Required

Design and build the project to achieve all of the following:

1. a. 90% of new buildings have a functional entry onto the circulation network or other public space, such as a park or plaza, but not a parking lot. Whether opening to the circulation network or other public space, the functional entry must be connected to a sidewalk or equivalent provision for walking. If the public space is a square, park, or plaza, it must be at least 50 feet (15 meters) deep, measured at a point perpendicular to each entry.
2. At least 15% of the block length of the existing and new circulation networks within and bordering the project has a minimum building-height-to-street-centerline ratio of 1:1.5 (i.e., a minimum of 1 foot [300 millimeters] of building height for every 1.5 feet [450 millimeters] of width from street centerline to building façade). Alleys may be omitted from the calculations.
  - Projects that border a part of the circulation network must meet only their proportional share of the height-to-width ratio (i.e., only on the project side of the circulation network).
  - Building height is measured to eaves or, for a flat-roof structure, to the rooftop. For buildings with multiple heights or widths, use average heights or widths weighted by each portion's share of the total height or width.
3. Continuous sidewalks or equivalent all-weather routes for walking are provided along both sides of 90% of the circulation network block length within the project, including the project side of circulation network bordering the project. Bicycle- and pedestrian-only paths meet this requirement. New sidewalks must be at least 8 feet (2.5 meters) wide on retail or mixed-use blocks and at least 4 feet (1.2 meters) wide on all other blocks.
4. No more than 20% of the block length of the circulation network within the project is faced directly by garage and service bay openings. Alleys may be omitted from the calculations.

Portions of projects containing historic buildings or contributing buildings in a designated historic district subject to review by a local historic preservation entity are exempt from (2), (3), and (4) if approval for compliance is not granted. Portions of projects containing historic buildings or contributing buildings in historic districts listed in or eligible for listing in a state provincial, or regional register, or the National Register of Historic Places that are subject to review by a state historic preservation office or the National Park Service (or local equivalent for projects outside the U.S.) are exempt from (2), (3), and (4) if approval for compliance is not granted.

## **Compact Development Required**

Design and build the project to meet the densities specified below. Minimum densities must be met for both (1) the entire project at full build-out and (2) the portion of the project that will be built within five years of the date that the first new building of any type is occupied.

Build any residential components of the project at a density of 7 or more dwelling units per acre (17.5 DU per hectare) of buildable land available for residential uses. Build any nonresidential components of the project at a density of 0.50 or higher FAR for the buildable land available for nonresidential uses.

Density calculations include all planned and existing buildings within the project boundary, excluding those portions of parking structures devoted exclusively to parking. If the residential component of the project meets the minimum density requirement but the nonresidential component does not, or vice versa, include only the qualifying density. Use that component's dwelling units or nonresidential floor area in the numerator and the total buildable land area in the denominator. If the resulting density meets the minimum requirement, the prerequisite is achieved.

## **Connected and Open Community Required**

Locate the project such that the connectivity within  $\frac{1}{4}$  mile (400 meters) of the project boundary is at least 90 intersections per square mile (35 intersections per square kilometer). Any part of the circulation network that is counted toward the connectivity requirement must be available for general public use and not gated. Gated areas are not considered available for public use, with the exception of education and health care campuses and military bases where gates are used for security purposes. Additionally, any circulation network within the project must be available for general public use and not gated.

**Walkable Streets**  
**4 Points**

A project may earn a maximum of 9 points, awarded according to Table 1.

Items achieved	Points
2-3	1
4-5	2
6-7	3
8-9	4
10-11	5
12	6
13	7
14	8
15-16	9

- At least 80% of the total linear distance of building façades facing the circulation network in the project is no more than 25 feet (7.5 meters) from the property line.
- At least 50% of the total linear distance of building façades facing the circulation network in the project is no more than 18 feet (5.5 meters) from the property line.
- If a façade extends along a sidewalk, no more than 40% of its length or 50 feet (15 meters), whichever is less, is blank (without doors or windows).
- Continuous sidewalks or equivalent provisions for walking are available along both sides of the entire circulation network within the project, including the project side of the circulation network bordering the project. Bicycle- and pedestrian-only paths meet this requirement. New sidewalks must be at least 10 feet (3 meters) wide on retail or mixed-use blocks and at least 5 feet (1.5 meters) wide on all other blocks. Note that these requirements specify wider sidewalks than required by NPD Prerequisite Walkable Streets. Alleys may be exempted.
- If the project has ground-floor dwelling units, the principal level of at least 50% of those units has an elevated finished floor at least 24 inches (60 centimeters) above the sidewalk grade. Below-grade basement spaces and/or accessory dwelling units are exempt from this requirement.
- At least 40% of the block length of the circulation network within the project has a minimum building-height-to-street-centerline ratio of 1:1.5 (i.e., at least 1 foot (30 centimeters) of building height for every 1.5 feet (45 centimeters) of width from circulation network centerline to building façade). Alleys may be exempted. Projects that border a part of the circulation network must meet only their proportional share of the height-to-centerline ratio (i.e., only on the project side of the circulation network). Building height is measured to eaves or, for a flat-roof structure, to the rooftop, and width is measured façade to centerline. For buildings with multiple heights or widths, use average heights or widths weighted by each portion's share of the total height or width.
- 75% of the length of new residential-only motorized parts of the circulation network within the project is designed for a target speed of no more than 20 mph (30 km/h).
- 70% of the length of new nonresidential or mixed-use motorized parts of the circulation network within the project is designed for a target speed of no more than 25 mph (40km/h). A multiway boulevard, with travel lanes separated from access lanes by medians, may apply this requirement to its outer access lanes only (through-lanes are exempt), provided pedestrian crosswalks are installed across the boulevard at intervals no greater than 800 feet (245 meters).
- At-grade crossings with driveways account for no more than 10% of the length of sidewalks within the project.

**Compact Development  
1 Point**

Residential density		Nonresidential density (FAR)	Points
DU/acre	DU/hectare		
> 10 and ≤ 13	> 25 and ≤ 32	> 0.75 and ≤ 1.0	1
> 13 and ≤ 18	> 32 and ≤ 45	> 1.0 and ≤ 1.25	2
> 18 and ≤ 25	> 45 and ≤ 62	> 1.25 and ≤ 1.75	3
> 25 and ≤ 38	> 62 and ≤ 94	> 1.75 and ≤ 2.25	4
> 38 and ≤ 63	> 94 and ≤ 156	> 2.25 and ≤ 3.0	5
> 63	> 156	> 3.0	6

Design and build the project such that residential and nonresidential components achieve the densities per acre/hectare of buildable land listed in Table 1 at build-out or within five years of the date that the first new building of any type is occupied (excluding those portions of parking structures devoted to parking), whichever is lower.

**Mixed Use Neighborhoods**  
**4 Points**

Locate or design the project such that 50% of its dwelling units are within a 1/4-mile (400-meter) walking distance of the number of uses (see [Appendix 1](#)) listed in Table 1. For projects with no dwelling units, 50% of dwelling units within a 1/4-mile (400-meter) walking distance of the project boundary must be within a 1/4-mile (400-meter) walking distance of the number of uses within the project specified in Table 1. The specified number of uses must be in place by the time of 50% occupancy of total building floor area (exclusive of portions of parking structures devoted to parking).

Diverse uses	Points
4-7	1
8-11	2
12-19	3
≥ 20	4

**Housing Types and Affordability**  
**7 Points**

Include a sufficient variety of housing sizes and types in the project such that the total variety of planned and existing housing within the project achieves a Simpson Diversity Index score greater than 0.5, using the housing categories below. Projects of less than

125 acres (50.5 hectares) may calculate the Simpson Diversity Index for the area within ¼ mile (400 meters) of the project’s geographic center. The Simpson Diversity Index calculates the probability that any two randomly selected dwelling units in a project will be of a different type. Score =  $1 - \sum (n/N)^2$  Where n = the total number of dwelling units in a single category, and N = the total number of dwelling units in all categories.

Simpson Diversity Index score	Points
> 0.5 to < 0.6	1
≥ 0.6 to < 0.7	2
≥ 0.7	3

Type	Square feet	Square meters
Detached residential, large	> 1,250	> 116
Detached residential, small	≤ 1,250	≤ 116

Include a proportion of new rental and/or for-sale dwelling units priced for households earning less than the area median income (AMI). Rental units must be maintained at affordable levels for a minimum of 15 years. Existing dwelling units are exempt from requirement calculations. Meet any combination of thresholds in Table 3, up to a maximum of 3 points.

Priced up to 100% AMI	
Percentage of total for-sale units	Points
5	1
10	2
15	3

A project may earn an additional point by earning at least 2 points in Option 1 and at least 2 points in Option 2 (at least one of which must be for providing housing at or below 100% AMI).

**Connected and Open Community  
2 Points**

Locate or design the project such that its internal connectivity falls within one of the ranges listed in Table 1. If the project has no internal circulation network, the connectivity within a ¼-mile (400-meter) distance of the project boundary must be used.



Intersections per square mile	Intersections per square kilometer	Points
300–400	116–154	1
> 400	> 154	2

All parts of the circulation network that are counted toward the connectivity requirement must be available for general public use at all times and not gated. No more than 10% of the project area may be gated. Education campuses, health care campuses, and military bases where gates are used for security purposes are exempt from the 10% limit, and intersections within those projects may be counted toward the connectivity requirement. AND Design or locate the project such that a through-connection (of the circulation network) intersects or terminates at the project boundary at least every 400 feet (122 meters) or at existing abutting intervals and intersections of the circulation network, whichever is the shorter distance. Include a pedestrian or bicycle through-connection in at least 90% of any new culs-de-sac. These requirements do not apply to portions of the boundary where connections cannot be made because of physical obstacles, such as prior platting of property, construction of existing buildings or other barriers, slopes steeper than 15%, wetlands and water bodies, railroad and utility rights-of-way, existing limited-access motor vehicle rights-of-way, and parks and dedicated open space.

## **Transit Facilities**

### **1 Point**

Work with the transit agency or agencies serving the project to inventory existing transit stops and new transit stops within the project boundary that will be warranted within two years of project completion (because of either increased ridership on existing service or planned transit). At those locations,

Confirm that transit facilities will be funded by either the transit agency or the project developer.

Install transit agency-approved shelters and any other required improvements at existing stops. Reserve space for transit facilities or install transit facilities at new stops.

Shelters must be covered, be at least partially enclosed to buffer wind and rain, have seating and illumination, and have signage that display transit schedules and route information.

## **Transportation Demand Management**

### **1 Point**

Achieve at least two of the following options. Earn 1 point for every two options, for a maximum of 2 points. For the purposes of this credit, existing buildings and their occupants are exempt from the requirements.

Provide transit passes valid for at least one year, subsidized to 100% of regular price, to each resident and employee locating within the project during at least the first three years of project occupancy. Publicize the availability of subsidized transit passes to project occupants.

Provide year-round, developer-sponsored transit service (vans, shuttles, buses) from at least one central point in the project to other major transit facilities or retail or employment centers, with service no less frequent than 45 daily weekday trips and 30 daily weekend trips. The service must begin by the time the project's total floor area is 20% occupied and must be guaranteed for at least three years beyond project build-out. The occupancy requirement is met when residents are living in 20% of the dwelling units and/or employees are working in 20% of the total nonresidential floor area. Provide transit stop shelters and bicycle racks adequate to meet projected demand but no less than one shelter and one bicycle rack at each transit stop. Shelters must be covered, be at least partially enclosed to buffer wind and rain, and have seating and illumination. Bicycle racks must have a two-point support system for locking the frame and wheels and must be securely affixed to the ground or a building.

## **Access to Civic and Public Space**

### **1 Point**

Locate or design the project such that a civic or passive-use space, such as a square, park, or plaza, at least 1/6 acre (675 square meters) in area lies within a ¼-mile (400-meter) walking distance of 90% of planned and existing dwelling units and nonresidential use entrances. Spaces less than 1 acre (0.4 hectare) must have a proportion no narrower than 1 unit of width to 4 units of length. Projects larger than 10 acres (4 hectares) must have a median space size of at least 1 acre (0.4 hectare).

Spaces over ½ acre (0.2 hectare) that are used to meet the 90% threshold are included in the median calculation.

## **Visitability and Universal Design**

### **1 Point**

Throughout the home, include at least five of the following universal design features:

- easy-to-grip lever door handles;
- easy-to-grip cabinet and drawer loop handles;
- easy-to-grip locking mechanisms on doors and windows;
- easy-to-grip single-lever faucet handles;
- easy-touch rocker or hands-free switches;
- motion-detector lighting at entrance, in hallways and stairwells, and in closets, and motion-detector light switches in garages, utility spaces, and basements;
- large, high-contrast print for controls, signals, and the house or unit numbers;
- a built-in shelf, bench, or table with knee space below, located outside the entry door with weather protection overhead, such as porch or stoop with roof, awning, or other overhead covering;
- a minimum 32-inch (80-centimeter) clear door opening width for all doorways;
- tread at the entrance, on stairs, and other areas where slipping is common, with color contrast difference between stair treads and risers; and
- interior floor surfaces (e.g., low-pile carpets, hard-surface flooring) that provide easy passage for a wheelchair or walker, with color contrast between floor surfaces and trim; no carpet is permitted in a kitchen, bathroom, or other wet areas of the dwelling unit.

## **Community Outreach and Involvement**

### **2 Points**

Engage the community in the following ways. Each activity must be led by the development team and be directly related to the LEED-ND project. *Pre-design* Meet with adjacent property owners, residents, business owners, and workers; local planning and community development officials; and any current residents or workers at the project site to solicit and document their input on the proposed project before beginning design. *Preliminary design* Advertise and host at least one open community meeting other than an official public hearing or recurring citizen advisory meeting, to generate comments on the preliminary project design concept. Work directly with community associations and/or the local government to advertise the meeting(s). Collect and summarize comments generated at the meeting(s). Modify the project's preliminary design as a

direct result of community input, or if modifications are not made, explain why community input did not generate design modifications. *Ongoing communication* Establish ongoing means for communication between the developer and the community throughout the design and construction phases and, in cases where the developer maintains any control, after construction.

Comply with Option 1 and conduct a design charrette or interactive workshop of at least two days that is open to the public and includes, at a minimum, participation by a representative group of nearby property owners, residents, business owners, and workers in the preparation of conceptual project plans and drawings.

## **Local Food Production**

### **1 Point**

Locate the project's geographic center within a 1/2-mile (800-meter) walking distance of an existing or planned farmers market that is open or will operate at least once weekly for at least five months annually. Farmers market vendors may sell only items grown within 150 miles (240 kilometers) of the project site. A planned farmers market must have firm commitments from farmers and vendors that the market will meet all the above requirements and be in full operation by the time 50% of the project's total floor area is occupied.

## **Tree-Lined and Shaded Streetscapes**

### **2 Points**

Provide trees at intervals of no more than 50 feet (12 meters) (exempting driveways) along at least 60% of the total existing and planned block length within the project, and on the project side of blocks bordering the project, between the vehicle travel way (if there is one) and walkway). Alleys may be exempted from the block length calculations.

Provide shade from trees or permanent structures over at least 40% of the total length of existing and planned sidewalks within or bordering the project (alleys may be exempted). Trees must provide shade within 10 years of landscape installation. Use the estimated crown diameter to calculate the length of sidewalk shaded.

From a registered landscape architect (or local equivalent for projects outside the U.S.), obtain a determination that planting details are appropriate to growing healthy trees, taking into account tree species, root medium, and width and soil volume of planter

strips or wells, and that the selected tree species are not considered invasive in the project context according to USDA or the state agricultural extension service (or local equivalent for projects outside the U.S.).

## **Neighborhood Schools**

### **1 Point**

Include in the project a residential component that constitutes at least 30% of the project's total building floor area, and locate or design the project such that at least 50% of the dwelling units are within a ½-mile (800-meter) walking distance of the functional entry of an existing or new elementary or middle school or within a 1-mile (1600-meter) walking distance of the functional entry of an existing or new high school. For any new school, the school authority must commit that the school will be open by the time 50% of the project dwelling units are occupied. A legally binding warrant committing to open the school by this time must be provided at the time of first building occupancy. Portions of the circulation network within or bordering the project boundary that lead from dwelling units to the school site must have (1) a complete network of sidewalks on both sides and (2) either continuous bicycle lanes or a combination of traffic control and calming measures (alleys may be exempted). If the school is planned as part of the project, it must be designed such that pedestrians and cyclists can easily reach building entrances without crossing bus zones, parking entrances, and student drop-off areas. New school campuses within the project boundary must not exceed the following limits:

- high school (15 - 18 years old), 15 acres (6 hectares);
- middle school (11 - 14 years old), 10 acres (4 hectares); and
- elementary school (6 - 10 years old), 5 acres (2 hectares).

Schools combining grade levels from more than one category may use the grade level with the higher allowable limits. Facilities on the school site (e.g., athletic fields, playgrounds, multipurpose interior spaces) for which there is a formal joint-use agreement with another entity may be deducted from the total site area of the school.

## **Green Infrastructure & Buildings**

### **Certified Green Building Required**

Design, construct, or retrofit one whole building within the project to be certified through a LEED rating system (if LEED for Commercial Interiors, 75% of the total building floor area must be certified), or through a green building rating system requiring review by independent, impartial, third-party certifying bodies that have been accredited by an IAF-accredited body to ISO/IEC Guide 65 or, when available, ISO/IEC 17065.

### **Minimum Building Energy Performance Required**

The requirements apply to 90% of the total building floor area (rounded up to the next whole building) of all nonresidential buildings, mixed-use buildings, and multiunit residential buildings four stories or more constructed as part of the project or undergoing major renovations as part of the project. Each counted building must comply with one of the following options.

### **Advanced Energy Design Guide**

Comply with the mandatory and prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.). Comply with HVAC and service water heating requirements applicable to the each building, including equipment efficiency, economizers, ventilation, and ducts and dampers, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone:

- ASHRAE 50% Advanced Energy Design Guide for Small to Medium Office Buildings, for office buildings smaller than 100,000 square feet (9 290 square meters);
- ASHRAE 50% Advanced Energy Design Guide for Medium to Large Box Retail Buildings, for retail buildings with 20,000 to 100,000 square feet (1 860 to 9 290 square meters);
- ASHRAE 50% Advanced Energy Design Guide for K–12 School Buildings; or
- ASHRAE 50% Advanced Energy Design Guide for Large Hospitals.
  - Over 100,000 square feet (9 290 square meters)

For projects outside the U.S., consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

### **Indoor Water Use Reduction Required**

90% of residential buildings must use a combination of fixtures and fittings that would earn 2 points under LEED v4 Building Design and Construction: Homes and Multifamily Lowrise WE Credit Indoor Water Use.

### **Construction Activity Pollution Prevention Required**

Create and implement an erosion and sedimentation control plan for all new construction activities associated with the project. The plan must incorporate best management practices (BMPs) to control erosion and sedimentation in runoff from the entire project site during construction. The BMPs must be selected from EPA's BMPs for construction and post-construction site runoff control. The erosion and sedimentation control plan must list the BMPs employed and describe how the project team will do the following:

- preserve vegetation and mark clearing limits;
- establish and delineate construction access;
- control flow rates;
- install sediment controls;
- stabilize soils;
- prevent soil loss during construction;
- stockpile topsoil for reuse;
- protect slopes;
- protect drain inlets, all rainwater conveyance systems, and receiving water bodies;
- stabilize channels and outlets;
- control pollutants including dust and particulate matter;
- control dewatering;
- maintain the BMPs; and
- manage the erosion and sedimentation control plan.

## Certified Green Building

### 5 Points

Design, construct, or retrofit one building as part of the project, beyond the prerequisite requirement, to be certified under a LEED green building rating systems (for LEED for Commercial Interiors, 75% of the total building floor area must be certified), or through a green building rating system requiring review by independent, impartial, third-party certifying bodies that have been accredited by an IAF-accredited body to ISO/IEC Guide 65 or, when available, ISO/IEC 17065. Up to five points may be earned for each additional certified building that is part of the project.

Percentage of total floor area certified	Points
≥ 10% and < 20%	1
≥ 20% and < 30%	2
≥ 30% and < 40%	3
≥ 40% and < 50%	4
≥ 50%	5

Detached accessory dwelling units must be counted as separate buildings. Accessory dwellings attached to a main building are not counted separately.



## **Optimize Building Energy Performance**

### **2 Points**

The requirements apply to 90% of the total building floor area (rounded up to the next whole building) of all nonresidential buildings, mixed-use buildings, and multiunit residential buildings four stories or more constructed as part of the project or undergoing major renovations as part of the project. Each counted building must comply with one of the following efficiency options.

For new single-family residential buildings and new multiunit residential buildings three stories or fewer, 90% of the buildings must reduce absolute estimated annual energy usage by 20% compared with the LEED Energy Budget for each building. Follow the method outlined in LEED v4 for Homes, EA Credit Annual Energy Use.

## **Indoor Water Use Reduction**

### **1 Point**

90% of buildings must use a combination of fixtures and fittings that would earn 4 points under LEED for Homes v4 WE Credit Indoor Water Use.

## **Outdoor Water Use Reduction**

### **2 Points**

Reduce outdoor water use through one of the following options. Nonvegetated surfaces, such as permeable or impermeable pavement, should be excluded from landscape area calculations. Athletic fields and playgrounds (if vegetated) and food gardens may be included or excluded at the project team's discretion.

Reduce the project's landscape water requirement (LWR) by at least 30% from the calculated baseline for the site's peak watering month. Reductions must first be achieved through plant species selection and irrigation system efficiency as calculated in the Environmental Protection Agency (EPA) WaterSense Water Budget Tool. Additional reductions beyond 30% may be achieved using any combination of efficiency, alternative water sources, and smart scheduling technologies.

Percentage reduction from baseline	Points
30%	1
50%	2

## Minimized Site Disturbance

### 1 Point

Locate 100% of the development footprint and the construction impact zone on previously developed land.

Survey the site to identify the following:

- trees in good or excellent condition, as determined by an arborist certified by the International Society of Arboriculture (ISA) or local equivalent professional for projects outside the U.S.;
- any heritage or champion trees of special importance to the community because of their age, size, type, historical association, or horticultural value, as defined by a government forester;
- all trees larger than 6 inches (15 centimeters) in diameter at breast height (dbh, 4 feet 6 inches [1.4 meters] above ground); and
- any invasive plant species that affect trees present on the site, and whether those plants threaten the health of other trees to be preserved on the site, as determined by an ISA-certified arborist or local equivalent professional.

Preserve the following trees that are also identified as in good or excellent condition:

- all heritage or champion trees and trees whose dbh exceeds 50% of the state champion dbh for the species;
- a minimum of 75% of all noninvasive trees (including the above) larger than 18 inches (45 centimeters) dbh; and
- a minimum of 25% of all noninvasive trees (including the above) larger than 12 inches (30 centimeters) dbh if deciduous and 6 inches (15 centimeters) dbh if coniferous.

Tree condition ratings must be determined by an ISA-certified arborist using ISA-approved assessment measures or by a local equivalent professional utilizing an equivalent methodology. Develop a plan, in consultation with and approved by an ISA-

certified arborist or equivalent, for the health of the trees, including fertilization and pruning, and for their protection during construction. If an ISA-certified arborist or local equivalent professional has determined that any trees to be preserved are threatened by invasive vegetation, develop a plan to reduce the invasive vegetation. Stipulate in codes, covenants, and restrictions or other binding documents that the undisturbed area of the preserved trees will be protected from development by a private or governmental agency for the purpose of long-term conservation.

### **Rainwater Management**

#### **3 Points**

In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the percentile of regional or local rainfall events listed in Table 1, using low-impact development (LID) and green infrastructure. Use daily rainfall data and the methodology in the U.S. Environmental Protection Agency (EPA) Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act to determine the percentile amounts listed in Table 1. The percentile rainfall event indicates the total volume to be retained on site.

Percentile rainfall event	Points
80th	1
85th	2
90th	3
95th	4

Projects that earn at least 2 points under this credit may earn an additional point if the site meets one of the following criteria.

- The project is located on a previously developed site.

## **Heat Island Reduction**

### **1 Point**

Use any combination of the following strategies for 50% of the nonroof site paving (including roads, sidewalks, courtyards, parking lots, parking structures, and driveways).

- Use the existing plant material or install plants that provide shade over the paving areas on the site within 10 years of plant material installation.
- Install and plant planters, either at grade or raised. Plant material cannot include artificial turf.
- Provide shade with structures covered by energy generation systems, such as solar thermal collectors, photovoltaics, and wind turbines, that produce energy used to offset some nonrenewable resource use.
- Provide shade with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation,
- Provide shade with vegetated structures.
- Use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation.
- Use an open-grid pavement system (at least 50% unbound).

## **Solar Orientation**

### **1 Point**

Design and orient 75% or more of the project's total building floor area (excluding existing buildings) such that one axis of each qualifying building is at least 1.5 times longer than the other, and the longer axis is within 15 degrees of geographical east-west. The length-to-width ratio applies only to walls enclosing conditioned spaces; walls enclosing unconditioned spaces, such as garages, arcades, or porches, cannot contribute to credit achievement. The surface area of equator-facing vertical surfaces and slopes of roofs of buildings counting toward credit achievement must not be more than 25% shaded at the time of initial occupancy, measured at noon on the winter solstice.

## Renewable Energy Production

### 3 Points

Incorporate on-site nonpolluting renewable energy generation, such as solar, wind, geothermal, small-scale or micro-hydroelectric, or biomass, with production capacity of at least 5% of the project's annual electrical and thermal energy cost (exclusive of existing buildings). Points are awarded according to Table 1.

Percentage of annual electrical and thermal energy cost	Points
5%	1
12.5%	2
20%	3

## District Heating and Cooling

### 2 Points

Incorporate a district heating and/or cooling system for space conditioning and/or water heating of new buildings (at least two buildings total) such that at least 80% of the project's annual heating and/or cooling consumption is provided by the district plant. Single-family residential buildings and existing buildings of any type may be excluded from the calculation. Each system component that is addressed by ANSI/ASHRAE/IESNA Standard 90.1–2010 must have an overall efficiency performance at least 10% better than that specified by the standard's mandatory requirements. Additionally, annual district pumping energy consumption that exceeds 2.5% of the annual thermal energy output of the heating and cooling plant must be offset by increases in the component's efficiency beyond the 10% improvement. If a

combined heat and power (CHP) system is used to comply with the credit requirements, show equivalence by demonstrating that energy consumption savings from the CHP plant at least equal the energy savings that would result from using a conventional district energy system with components that are 10% better than ANSI/ASHRAE/IESNA Standard 90.1–2010. When determining equivalency, take into account the pumping energy as described above.

### **Infrastructure Energy Efficiency**

#### **1 Point**

Design, purchase, or work with the municipality to install all new infrastructure (e.g., traffic lights, street lights, water and wastewater pumps) to achieve a 15% annual energy reduction below an estimated baseline energy use for this infrastructure. When determining the baseline, assume the use of lowest first-cost infrastructure items.

### **Recycled and Reused Infrastructure**

#### **1 Point**

Use materials for new infrastructure such that the sum of the postconsumer recycled content, on-site reused materials and one-half of the preconsumer recycled content constitutes at least 50% of the total mass of infrastructure materials. Count materials in all of the following infrastructure items, as applicable:

- roadways, parking lots, sidewalks, unit paving, and curbs;
- water retention tanks and vaults;
- base and sub-base materials for the above; and
- rainwater, sanitary sewer, steam energy distribution, and water piping.

Recycled content is defined in accordance with ISO/IEC 14021, Environmental Labels and Declaration, Self-Declared Environmental Claims (Type II environmental labeling).

### **Solid Waste Management**

#### **1 Point**

Meet at least four of the following five requirements and publicize their availability and benefits.

1. Include as part of the project at least one recycling or reuse station, available to all project occupants, dedicated to the separation, collection, and storage of materials for recycling; or locate the project in a local government jurisdiction that

provides recycling services. The recycling must cover at least paper, corrugated cardboard, glass, plastics, and metals.

2. Include as part of the project at least one drop-off point, available to all project occupants, for potentially hazardous office or household wastes and establish a plan for postcollection disposal or use; or locate the project in a local government jurisdiction that provides collection services. Examples of potentially hazardous wastes include paints, solvents, oil, mercury-containing lamps, electronic waste, and batteries.
3. Include as part of the project at least one compost station or location, available to all project occupants, dedicated to the collection and composting of food and yard wastes, and establish a plan for postcollection use; or locate the project in a local government jurisdiction that provides composting services.
4. Recycle, reuse, or salvage at least 50% of nonhazardous construction, demolition, and renovation debris. Calculations can be done by weight or volume but must be consistent throughout. Develop and implement a construction waste management plan that identifies the materials to be diverted from disposal and specifies whether the materials will be stored on site or commingled. Reused or recycled asphalt, brick, and concrete (ABC) can account for no more than 75% of the diverted waste total. Excavated soil, land-clearing debris and materials contributing toward GIB Credit Building Reuse do not qualify for this credit. Include materials destined for alternative daily cover (ADC) in the calculations as waste (not diversion).

## **Light Pollution Reduction**

### **1 Point**

Meet the Light Pollution Reduction requirements for the following:

1. One option in Exterior Lighting for Residential Areas
2. Exterior Lighting for Circulation Network
3. Uplight and light trespass requirements in Exterior Lighting for All Other Areas
4. Covenants, Conditions, and Restrictions.

Divide the project into model lighting ordinance (MLO) lighting zones LZ0 to LZ4 based on site-specific characteristics using the definitions of lighting zones provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) MLO User Guide. Meet the requirements below for each lighting zone within the project.

Each fixture must have a backlight-uplight-glare (BUG) rating (as defined in IES TM-15-11, Addendum A) of no more than B2-U2-G2.

For any portions of the circulation network not governed by national, state, or other superseding regulations, do not install street lighting unless conditions warrant the need for street lighting. New and existing street lighting luminaires must not emit any light above 90 degrees (horizontal), based on the photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design or as currently installed. Exception for ornamental luminaires: Using the lowest MLO lighting zone for immediately adjacent properties, meet the requirements of the IES/IDA MLO, Table H.

Use either the BUG method (Option 1) or the calculation method (Option 2) to meet uplight and light trespass requirements. Projects may use different options for uplight and light trespass.

Do not exceed the following luminaire uplight ratings, based on the specific light source installed in the luminaire, as defined in IES TM-15-11, Addendum A.

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



Do not exceed the following luminaire backlight and glare ratings (based on the specific light source installed in the luminaire) as defined in IES TM-15-11, Addendum A, based on the mounting location and distance from the lighting boundary.

Establish covenants, conditions, and restrictions (CC&R) or other binding documents that require continued adherence to the above requirements.

## **Innovation & Design Process**

### **Innovation**

#### **5 Credits**

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance credits.

#### **Option 1. innovation (1 point)**

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system. Identify the following:

- the intent of the proposed innovation credit;
- proposed requirements for compliance;
- proposed submittals to demonstrate compliance; and
- the design approach or strategies used to meet the requirements.

AND/OR

#### **Option 2. pilot (1 point)**

Achieve one pilot credit from USGBC's LEED Pilot Credit Library AND/OR

#### **Option 3. additional strategies (3 points)**

- **Innovation (1-3 points)**  
Defined in Option 1 above.
- **Pilot (1-3 points)**  
Meet the requirements of Option 2.
- **Exemplary performance (1–2 points)**  
Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition. An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold.

### **LEED Accredited Professional**

#### **1 Point**

At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.



# LEED v4 for Building Design and Construction: Homes and Multifamily Lowrise

## Project Checklist

Project Name: Housing Option Roosevelt A  
Date: 3/6/2020

Y ? N

2		Credit	Integrative Process	2
<b>15 0 15 Location and Transportation 15</b>				
Y		Prereq	Floodplain Avoidance	Required
<b>PERFORMANCE PATH</b>				
15		Credit	LEED for Neighborhood Development Location	15
<b>PRESCRIPTIVE PATH</b>				
	8	Credit	Site Selection	8
	3	Credit	Compact Development	3
	2	Credit	Community Resources	2
	2	Credit	Access to Transit	2
<b>7 0 0 Sustainable Sites 7</b>				
Y		Prereq	Construction Activity Pollution Prevention	Required
Y		Prereq	No Invasive Plants	Required
	2	Credit	Heat Island Reduction	2
	3	Credit	Rainwater Management	3
	2	Credit	Non-Toxic Pest Control	2
<b>9 0 13 Water Efficiency 12</b>				
Y		Prereq	Water Metering	Required
<b>PERFORMANCE PATH</b>				
9	3	Credit	Total Water Use	12
<b>PRESCRIPTIVE PATH</b>				
	6	Credit	Indoor Water Use	6
	4	Credit	Outdoor Water Use	4
<b>29 0 37 Energy and Atmosphere 38</b>				
Y		Prereq	Minimum Energy Performance	Required
Y		Prereq	Energy Metering	Required
Y		Prereq	Education of the Homeowner, Tenant or Building Manager	Required
<b>PERFORMANCE PATH</b>				
20	9	Credit	Annual Energy Use	29
<b>BOTH PATHS</b>				
	5	Credit	Efficient Hot Water Distribution System	5
	2	Credit	Advanced Utility Tracking	2
	1	Credit	Active Solar Ready Design	1
	1	Credit	HVAC Start-Up Credentialing	1
<b>PRESCRIPTIVE PATH</b>				
Y		Prereq	Home Size	Required
	3	Credit	Building Orientation for Passive Solar	3
	2	Credit	Air Infiltration	2
	2	Credit	Envelope Insulation	2
	3	Credit	Windows	3
	4	Credit	Space Heating & Cooling Equipment	4

<b>EA PRESCRIPTIVE PATH (continued)</b>				
	3	Credit	Heating & Cooling Distribution Systems	3
	3	Credit	Efficient Domestic Hot Water Equipment	3
	2	Credit	Lighting	2
	2	Credit	High Efficiency Appliances	2
	4	Credit	Renewable Energy	4

<b>10 0 0 Materials and Resources 10</b>				
Y		Prereq	Certified Tropical Wood	Required
Y		Prereq	Durability Management	Required
	1	Credit	Durability Management Verification	1
	4	Credit	Environmentally Preferable Products	4
	3	Credit	Construction Waste Management	3
	2	Credit	Material Efficient Framing	2

<b>15 0 1 Indoor Environmental Quality 16</b>					
Y		Prereq	Ventilation	Required	
Y		Prereq	Combustion Venting	Required	
Y		Prereq	Garage Pollutant Protection	Required	
Y		Prereq	Radon-Resistant Construction	Required	
Y		Prereq	Air Filtering	Required	
Y		Prereq	Environmental Tobacco Smoke	Required	
Y		Prereq	Compartmentalization	Required	
	3	Credit	Enhanced Ventilation	3	
	2	Credit	Contaminant Control	2	
	3	Credit	Balancing of Heating and Cooling Distribution Systems	3	
	1	Credit	Enhanced Compartmentalization	1	
	2	Credit	Enhanced Combustion Venting	2	
	1	1	Credit	Enhanced Garage Pollutant Protection	2
	3	Credit	Low Emitting Products	3	

<b>6 0 0 Innovation 6</b>				
Y		Prereq	Preliminary Rating	Required
	5	Credit	Innovation	5
	1	Credit	LEED AP Homes	1

<b>0 0 4 Regional Priority 4</b>				
	1	Credit	Regional Priority: Specific Credit	1
	1	Credit	Regional Priority: Specific Credit	1
	1	Credit	Regional Priority: Specific Credit	1
	1	Credit	Regional Priority: Specific Credit	1

**91 0 70 TOTALS** Possible Points: **110**  
 Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

**LEED**  
**V4 for Building Design and**  
**Construction: Homes and**  
**Multifamily Lowrise**

**Proposed Credits**  
**Project List**

## **Integrative Process**

### **2 Points**

Assemble and involve a project team to meet the three criteria below: a) Include team members whose capabilities include at least three of the following skill sets:

- architecture or residential building design;
- mechanical or energy engineering;
- building science or performance testing;
- green building or sustainable design; and
- civil engineering, landscape architecture, habitat restoration, or land-use planning.

b) Involve all team members referenced above in at least three of the following phases of the home design and construction process:

- conceptual or schematic design;
- LEED planning;
- preliminary design;
- energy and envelope systems analysis or design;
- design development;
- final design, working drawings or specifications; and
- construction.

c) Conduct meetings with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems, formulate solutions, review responsibilities, and identify next steps.

No later than the design development phase and preferably during schematic design, conduct at least one full-day workshop (or two half-day workshops) with the project team, as defined in Option 1. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants.

## **Location and Transportation**

### **Floodplain Avoidance Required**

Do not develop buildings on land that lies within a flood hazard area shown on a legally adopted flood hazard map (such as the Federal Emergency Management Agency (FEMA) 100 year flood plain) or otherwise legally designated by the local jurisdiction or the state, unless the building is designed and built in accordance with the flood provisions of applicable building code, the local floodplain management regulations, or, at a minimum, the National Flood Insurance Program Requirements. Projects outside of the United States may use a local equivalent program to NFIP if the program is equal to or more stringent. Previously developed buildings and hardscapes are exempt from the above requirements.

### **LEED for Neighborhood Development Location 15 Points**

Locate the project within the boundary of a development certified under LEED for Neighborhood Development (Stage 2 or Stage 3 under the Pilot or 2009 rating systems, Certified Plan or Certified Project under the v4 rating system). Projects attempting this credit are not eligible to earn points under other Location and Transportation credits.

# Sustainable Sites

## Construction Activity Pollution Prevention Required

Stockpile and protect disturbed topsoil from erosion (for reuse). Control the path and velocity of runoff with silt fencing or comparable measures. Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures. Provide swales to divert surface water from hillsides. Use tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that is disturbed during construction. Prevent air pollution from dust and particulate matter. Construction sites larger than 1 acre must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit or local equivalent, whichever are more stringent.

## No Invasive Plants Required

Introduce no invasive plant species into the landscape. Invasive plant species vary by region. Consult the U.S. Department of Agriculture’s GRIN Taxonomy for Plants database, the National Association of Exotic Pest Plant Councils, or local cooperative extension service or state or national exotic pest lists for plants in natural areas and wildlands. Not all nonnative species are considered invasive.

## Heat Island Reduction 2 Points

Ensure that at least 50% of hardscapes and roofs, but not including common roads that serve multiple buildings, on the project site meet one or more of the following requirements. Points are awarded according to Table 1.

Percentage of hardscape area	Points
50–75%	1
> 75%	2

Install light-colored, high-albedo materials or vegetation-covered hardscapes.

Acceptable strategies include the following:

- using ENERGY STAR qualified roof products in appropriately sloped applications (or performance equivalent for projects outside the U.S.);
- installing vegetated roofing;
- using open pavers (counting only the vegetation, not the pavers) or engineered grass pavers; and
- Use paving materials with a three-year aged solar reflectance (SR) of at least 0.28. If three-year aged value information is not available, use materials with an initial SR of at least 0.33 at installation.

## **Rainwater Management**

### **3 Points**

Projects that must comply with local requirements of the National Pollutant Discharge Elimination System (NPDES) must follow Case 2.

Use low-impact development (LID) techniques to minimize the amount of stormwater that leaves the site. Examples of acceptable techniques include the following:

- planting areas with native or adapted plant material (e.g. trees shrubs);
- installing a vegetated roof;
- using permeable paving, consisting of porous above-ground materials (e.g., open pavers, engineered products), a base layer designed to drain water away from the home, and (often) a 6-inch-deep (150 millimeters) subbase; and
- installing permanent infiltration or collection features (e.g., vegetated swale, rain garden, rainwater cistern) that can handle 100% of the runoff from a two-year, 24-hour storm.

Single-family home projects may use Table 1 or Table 2 to determine points; multifamily projects must use Table 1. To determine compliance for single-family and multifamily homes, calculate the percentage of the lot area, including the area under roof, that is permeable or can direct water to an on-site catchment or infiltration feature.



Percentage	Points
50–64%	1
65–79%	2
≥80%	3

## Non-Toxic Pest Control

### 2 Points

Each measure is worth ½ point, except as noted.

- Install a steel mesh barrier termite control system (1 point).
- Install a physical termite barrier system (e.g., basaltic rock) approved by code (1 point).
- For below-grade walls, use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block.
- Install post-tension slabs.
- Treat all cellulosic structural material (e.g., wood framing) with a registered pesticide containing borates, following the manufacturer's directions for preconstruction treatment.
- Use noncellulosic material for all structural elements.
- Install ports or openings for all plumbing elements that penetrate the slab, to allow access for inspection and treatment of pest infestations.
- Install a registered termite bait system and provide for ongoing maintenance as required by the manufacturer.
- Design a minimum 6-inch (150 millimeter) inspection space between the surface of the planned landscape grade and nonmasonry siding.
- Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh) on all openings greater than ¼ inch (6 millimeters), except where code prohibits their installation (e.g., dryer vents).
- Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches (600 millimeters) from the foundation.

- Design landscape features to provide a minimum 18-inch (450 millimeter) space between the exterior wall and any plantings.

In addition, multifamily building projects must develop an integrated pest management policy that includes guidance for residents on pesticide use, housekeeping, and prompt reporting of pest problems; incorporate the policy in the Homeowner Education Manual.

# Water Efficiency

## Water Metering Required

Install a whole-house water meter. Single-family attached homes may share a whole-building water meter if landscaping is commonly managed and any units that will not achieve LEED certification are separately metered. Encourage homeowners or tenants to share water usage data with USGBC via a USGBC-approved third-party. Homes that use only well water and are not connected to a municipal water system are exempt from this prerequisite.

## Total Water Use 9 Points

Reduce total indoor and outdoor water consumption by at least 10% over standard practices. For indoor water savings, use the Water Reduction Calculator to determine the average flush or flow rate for each fixture type and the estimated daily usage. The baselines for indoor water consumption are shown in Table 1.

Fixture	Baseline flush or flow rate		Estimated fixture usage	Estimated water usage	
Shower (per compartment)	2.5 gpm	9.5 lpm	6.15 minutes	15.4 gallons	58.4 liters
Lavatory, kitchen faucet	2.2 gpm	8.3 lpm	5.0 minutes	11 gallons	41.5 liters
Toilet	1.6 gpf	6 lpf	5.05 flushes	8 gallons	30.3 liters
Clothes washer	9.5 WF	9.5 WF	0.37 cycles @ 3.5 ft <sup>3</sup> (@0.1 m <sup>3</sup> )	15.1 gallons	57.1 liters
Dishwasher	6.5 gpc	24 lpc	0.1 cycles	0.7 gallons	2.4 liters

The water pressure in single-family buildings must not exceed 60 psi (415 kPa), with no detectable water leaks. Any installed water softeners must be demand initiated. For outdoor water savings, use the EPA WaterSense Water Budget Tool to calculate the baseline landscape water consumption and the design landscape water consumption. Implement the following measures to further reduce landscape water consumption. Add the savings associated with each of the following strategies to the reduction from the landscape water requirement, as calculated in the Water Budget Tool:

- Install smart scheduling technology. This strategy counts for a maximum reduction of 30% provided all landscape water use is controlled by a soil moisture sensor control system or a weather-based irrigation control system.
- Use captured rainwater.
- Use reclaimed water.
- Use water treated on site or conveyed by a public agency specifically for nonpotable uses (water from naturally occurring surface water bodies, such as streams and rivers, and groundwater, such as well water, does not count).

Percentage reduction	Points
10%	1
15%	2
20%	3
25%	4
30%	5
35%	6
40%	7
45%	8
50%	9
55%	10
60%	11
65%	12

## Energy and Atmosphere

### Minimum Energy Performance Required

Meet all of the following requirements:

1. Complete all mandatory measures of ENERGY STAR for Homes version 3. Achieve a HERS Index rating that meets or exceeds the ENERGY STAR HERS Index Target (or USGBC-approved equivalent for projects outside the U.S.). Certified passive house projects automatically meet the Thermal Enclosure System section of the Rater Design Review checklist.
2. If installed, at least one of the following appliances must be ENERGY STAR qualified (or performance equivalent for projects outside the U.S.) in each dwelling unit:
  - refrigerator;
  - dishwasher; or
  - clothes washer.
  -
3. All duct runs must be fully ducted (i.e., building cavities may not be used as ducts).

Existing portions of an existing building are given the following allowances: *Rater Design Review Checklist* 3.1. Slab insulation is strongly encouraged but not required to meet or exceed 2009 IECC levels. *Rater Field Checklist* 3.1. Attic insulation at the intersection of existing roof and existing exterior walls does not have to meet R-value requirements. 3.4. Advanced framing is not required on existing framed walls, 4.3. Existing sill plates on top of concrete are not required to be placed on a foam gasket. *Water Management System Builder Requirements Water-Managed Site and Foundation* 1.3. A capillary break under an existing slab is not required unless there are visible signs of moisture damage on the slab floor. 1.5. Exterior below-grade walls are not required to be damp-proofed on the exterior surface unless there are visible signs of moisture damage on the interior of the wall. 1.8 - Drain tiles surrounded with clean gravel and fabric filter are not required for existing slabs, unless there are visible signs of moisture damage on the slab floor 2, 3. Water-managed wall and roof assembly requirements are not required for existing walls or roofing unless there are signs of moisture damage related to vulnerabilities in the walls or roof.

## **Energy Metering Required**

Install whole-house electric and gas meters, as applicable. Encourage homeowners or tenants to share energy usage data with USGBC via a USGBC-approved third-party by describing the benefits of participation in the Homeowner Education Manual.

## **Education of Homeowner, Tenant or Building Manager Required**

Provide to all individuals or organizations responsible for ongoing maintenance of the home (e.g., occupants, building managers, maintenance contractors) an operations and maintenance manual, binder, or CD that includes all the following items:

- the completed checklist of LEED for Homes features;
- copies of all ENERGY STAR for Home, version 3, checklists;
- product manufacturers' manuals for all installed equipment, fixtures, and appliances;
- general information on efficient use of energy, water, and natural resources;
- operations and maintenance guidance for any installed equipment, including space heating and cooling, mechanical ventilation, humidity control, radon protection, renewable energy, and irrigation, rainwater harvesting, or graywater systems (following 2009 EPA WaterSense Single-Family New Home Specifications, item 5.0, Homeowner Education);
- guidance on occupants' activities and choices, including cleaning materials and methods, water-efficient landscaping, integrated pest management, effects of chemical fertilizers and pesticides, irrigation, lighting selection, and appliance selection;
- information on local green power options; and
- information on sharing utility data with USGBC via a USGBC-approved third party.

In addition, conduct a minimum one-hour walkthrough of the home with the occupants. For buildings with building managers, include the building manager. The walkthrough must feature the following:

- identification of all installed equipment;
- instruction in how to use and operate the equipment; and
- information on its maintenance.

Prerequisite required for all projects, whether they use the EA performance or EA prescriptive path

## **Annual Energy Use**

### **29 Points**

Design and construct a home whose modeled annual energy usage achieves a HERS index rating of 70 or better (or USGBC-approved equivalent for projects outside the U.S.). Points are awarded according to Table 3.

## **Efficient Hot Water Distribution System**

### **5 Points**

To minimize wasted water before hot water is delivered, using EPA WaterSense testing procedures, verify that no more than 0.25 gallons (1 liter) of water can be collected from the hot water fixture furthest from the recirculation loop. Systems that use heat traces that serve a single unit or house are awarded only half credit. All heat traced piping must be insulated.

Install at least R-4 insulation on all domestic hot water piping, including subslab pipes. Insulation on all piping elbows and tees must adequately insulate changes in direction. Run buried piping in a slab or below grade through a protective, waterproof raceway, channel, sleeve, or path whose internal dimensions and changes of direction are large enough that the piping and insulation can be removed and replaced without damaging the piping's dimensional integrity. The waterproof sleeve is not required for below-grade piping if the insulation manufacturer stipulates that the pipe insulation will maintain its insulating value in underground applications in damp soil when installed according to the manufacturer's instructions. This exception does not apply to piping that runs through or under building slabs.

## **Advanced Utility Tracking**

### **2 Points**

Meet one of the following: Install a permanent energy-monitoring system that records at intervals of one hour or less and is equipped with the ability to transmits data to the homeowner or occupant at a remote location (e.g., computer, in-house display). OR If the project has an automatic in-ground irrigation system and the landscape irrigated area is larger than 1,000 square feet, install a submeter to monitor all irrigation system components.

The homeowner must share all applicable utility data with USGBC via a USGBC-approved third-party before the project team submits its application for certification.

### **Active Solar Ready Design**

#### **1 Point**

A project team that installs a photovoltaic (PV) system that meets the requirements of EA Credit Renewable Energy is not eligible for this credit. Meet EPA's solar photovoltaic specifications for a renewable energy-ready home. Provide detailed information about such systems in the homeowner education manual so that future occupants can install an active PV system.

### **HVAC Start-Up Credentialing**

#### **1 Point**

Have all heating, cooling, and ventilation systems commissioned by a technician with North American Technician Excellence certification, HVAC contractor credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (HQITO) (or equivalent as defined by USGBC). The technician must complete the ENERGY STAR for Homes, version 3, HVAC system quality installation contractor checklist, or equivalent as defined by USGBC.



## Materials and Resources

### Certified Tropical Wood Required

All wood in the building must be nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent. For the purposes of this prerequisite, a tree species is considered tropical if it is grown in a location that lies between the Tropic of Cancer and the Tropic of Capricorn.

### Durability Management Required

Meet the requirements of the ENERGY STAR for Homes, version 3, water management system builder checklist (with the exceptions for existing homes listed in EA Prerequisite Minimum Energy Performance). Midrise projects are exempt from this requirement. Install all the applicable indoor moisture control measures listed in Table 1.

Location or equipment	Required measure
Area directly above bathtub, spa, or shower (extending to ceiling), exposed wall or area behind fiberglass enclosure if wallboard is installed	Use nonpaper-faced backer board or paper-faced product or coating over wallboard that meets standard ASTM D 3273 standard
Kitchen, bathroom, laundry room, spa area	Use water-resistant flooring; do not install carpet
Entryway within 3 feet (900 mm) of exterior door accessible from ground	Use water-resistant flooring; do not install carpet (carpet tiles are permitted)
Tank water heater in or over living space	Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, or floor drain with floor sloped to drain
Clothes washer (or condensing clothes dryer) in or over living space	Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, or floor drain with floor sloped to drain
Conventional clothes dryer	Exhaust directly to outdoors

## **Durability Management Verification**

### **1 Point**

Have the verification team inspect and verify each measure listed in the ENERGY STAR for Homes, version 3, water management system builder checklist.

## **Environmentally Preferable Products**

### **4 Points**

Use building component materials that meet one or more of the criteria below. A material must make up 90% of the component by weight or volume, except as noted. A single component that meets Option 1 and Option 2 can earn points for each.

Use products that meet one or more of the following criteria. At least 90% of each compliant building component (listed in Table 2), by weight or volume, must meet one of the requirements below. A single component that meets more than one criterion does not earn additional credit.

- The product contains at least 25% reclaimed material, including salvaged, refurbished, or reused materials. For renovation projects, existing components are considered reclaimed. Wood by-products can be counted as reclaimed material. These include items from secondary manufacturers; felled, diseased, or dead trees from urban or suburban areas; orchard trees that are unproductive and cut for replacement; and wood recovered from landfills or water bodies.
- The product contains at least 25% postconsumer or 50% preconsumer content.
- Wood products must be Forest Stewardship Council (FSC) Certified, or USGBC-approved equivalent.
- Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material.
- Concrete that consists of at least 30% fly ash or slag used as a cement substitute and 50% recycled content or reclaimed aggregate OR 90% recycled content or reclaimed aggregate.
- Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility.

Component	Maximum points
Flooring - Base floor only (i.e., sealed concrete, no floor covering)	2
Floor covering	1
Insulation*	1
Sheathing	1
Framing	1
Drywall, interior finish	1
Concrete: cement and / or aggregate	1
Roofing	1
Siding	1

Additional components (install at least 3 of the following):

- Doors (not including insulated doors or garage door)

- Cabinets
- Counters (kitchens and bathrooms)
- Interior trim
- Decking or patio material
- Windows

**Construction Waste Management**  
**3 Points**

Reduce total construction waste or divert from landfills and incinerators a large proportion of the waste generated from new construction. Use the tables below to calculate the percentage of waste avoided or recycled. Exclude excavated soil, land-clearing debris from calculations. Include materials destined for alternative daily cover (ADC) in the calculations as waste (not diversion). Any waste-to-energy is not considered recycling for this credit.

Percentage reduction	Points
10%	0.5
20%	1.0
30%	1.5
40%	2.0
50%	2.5
60%	3.0

## Material Efficient Framing

### 2 Points

Implement any of the following advanced framing techniques for at least 90% of each component.

- Implement one of the following optimum value engineering measures in exterior walls and common walls (1 point):
  - Install no more than one horizontal 2x top plate on walls by aligning studs with joists and roof rafters.
  - Place window and door headers in the rim joist.
  - Install raised (directly beneath the top plate), single-ply headers not more than 2 inches nominal thickness in a 2x4 wall or 4 inches nominal thickness in a 2x6 wall, in accordance with International Residential Code 2012.
  - Install structural insulated panels (SIPs) for walls.
- Implement any two of the following for all interior and exterior walls (0.5 point):
  - Size headers for actual loads.
  - Use ladder blocking or drywall clips.
  - Use two-stud corners or California corners.
- Space interior wall studs greater than 16 inches o.c. (400 mm o.c.) (0.5 point).
- Space floor joists greater than 16 inches o.c. (400 mm o.c.) or SIPs (0.5 point).
- Space roof rafters greater than 16 inches o.c. (400 mm o.c.) or SIPs (0.5 point).

For renovation projects, existing components may be excluded from the calculation. Modular, panelized, or other prefabricated wall or structural systems must comply with the requirements.

# Indoor Environmental Quality

## Ventilation Required

Meet all of the following requirements for local exhaust and outdoor air ventilation including the requirements of ASHRAE 62.2 – 2010, sections 4, 5 and 7 and Section 1503.4 of the 2009 International Residential Code (IRC), including:

1. Local Exhaust. Meet all the following requirements: Design and install local exhaust systems in all bathrooms (including half-baths) and the kitchen to meet the requirements of ASHRAE Standard 62.2–2010, Sections 5 and 7 or local equivalent, whichever is more stringent. Sample requirements that relate to minimum intermittent local exhaust flow rates are shown in Table 1. Exhaust air to the outdoors. Do not route exhaust ducts to terminate in attics or interstitial spaces. Recirculating range hoods or recirculating over-the-range microwaves do not satisfy the kitchen exhaust requirements. Use ENERGY STAR–labeled bathroom exhaust fans in all bathrooms (including half-baths) or performance equivalent for projects outside the U.S. A HRV or ERV can be used to exhaust single or multiple bathrooms if it has an efficacy level meeting the ENERGY STAR Technical Specifications for Residential Heat-Recovery Ventilators and Energy-Recovery Ventilators (H/ERVs) Version 2.0 as certified by HVI. For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), provide makeup air at a rate approximately equal to the exhaust air rate. Makeup air systems must have a means of closure and be automatically controlled to start and operate simultaneously with the exhaust system.

	Minimum air flow
Kitchen	100 cfm (47 liters per second); vented range hood required if continuous exhaust fan flow rate is less than 5 kitchen air changes per hour
Bathroom, half-bath	50 cfm (23 liters per second)

Whole House Mechanical Ventilation. Design and install a whole-house mechanical ventilation system that complies with ASHRAE Standard 62.2–2010, Sections 4 and 7 or local equivalent, whichever is more stringent. Whole house ventilation fans must be rated for sound at a maximum of 1.0 sone per ASHRAE 62.2–2010, Section 7.2.1. Remote mounted fans need not meet these sound requirements. The ASHRAE options can be summarized as follows:

- Continuous ventilation. Meet the ventilation requirements. Simplified minimum air-flow requirements are shown in Table 2.
- Intermittent ventilation. Use ASHRAE Standard 62.2–2010, Equation 4.2, to demonstrate adequate ventilation air flow.
- Any passive ventilation system must be approved and verified by a licensed HVAC engineer as providing ventilation equivalent to that achieved by continuous ventilation systems.

Conditioned floor area (ft <sup>2</sup> )	Bedrooms				
	0, 1	2, 3	4, 5	6, 7	> 7
≤1,500	30	45	60	75	90
1,501–3,000	45	60	75	90	105
3,001–4,500	60	75	90	105	120
4,501–6,000	75	90	105	120	135
6,001–7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

## **Combustion Venting Required**

Do not install any unvented combustion appliances (ovens and ranges excluded). Install a carbon monoxide (CO) monitor on each floor, hard-wired with a battery backup. In multifamily buildings, install a CO monitor on each floor of each unit. For all fireplaces and woodstoves inside the building, provide doors that close or a solid glass enclosure. Interior fireplaces and woodstoves that are not closed-combustion or power-vented must pass BPI or RESNET combustion safety testing protocols to ensure that depressurization of the combustion appliance zone is less than 5 Pa. Space- and water-heating equipment that involves combustion must meet one of the following:

- it must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting);
- it must be designed and installed with power-vented exhaust; or
- it must be located in a detached utility building or open-air facility.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

## **Garage Pollutant Protection Required**

Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage. Tightly seal shared surfaces between the garage and conditioned spaces, including all of the following:

- In conditioned spaces above the garage, seal all penetrations and all connecting floor and ceiling joist bays.
- In conditioned spaces next to the garage, weather-strip all doors, install carbon monoxide detectors in rooms that share a door with the garage, seal all penetrations, and seal all cracks at the base of the walls.

Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

## **Radon-Resistant Construction Required**

If the building is in EPA radon zone 1 (or local equivalent for projects outside the United States), design and build with radon-resistant construction techniques, as prescribed by



American Association of Radon Scientist and Technologists (AARST), Reducing Radon in New Construction of 1 & 2 Family (RRNC 2.0); EPA Building Radon Out; NFPA 5000, Chapter 49; International Residential Code, Appendix F; CABO, Appendix F; ASTM E1465; or a local equivalent, whichever is more stringent. Follow all the requirements listed in Indoor airPLUS, 2.1:

- Provide a capillary break per the Indoor airPLUS specifications.
- Provide an electrical outlet near vent piping in the attic to facilitate future fan installation.
- Install a 3- or 4-inch (or approximately 80- or 100- millimeters) diameter gas-tight vertical vent pipe with no bends greater than 45 degrees, connected to an open T-fitting in the aggregate layer, extending up through the conditioned spaces and terminating at least 12 inches (300 millimeters) above the roof opening.

The requirements for radon protection are automatically satisfied if the building is elevated by at least 2 feet (600 millimeters), with open air space between the building and ground. An enclosed vented crawlspace does not qualify. A garage under a building is an acceptable alternative. For mixed-use buildings, nonresidential space is exempted.

### **Air Filtering Required**

Install air filters with a minimum efficiency reporting value (MERV) of 8 or higher on all recirculating space conditioning systems, per ASHRAE 62.2–2010. Design ductwork and specify the central blower to account for the pressure drop across the filter. Air filter housings must be airtight to prevent bypass or leakage. Nonducted systems are exempt from the minimum MERV 8 requirements but must have an internal air filter in the air-handling unit. Install air filters rated MERV 6 or higher for mechanically supplied outdoor air for systems with 10 feet (3 meters) of ductwork or more, per ASHRAE 62.2–2010, Section 6.7. Projects may use equivalent filtration media class of F5 or higher for MERV 8 and G4 or higher for MERV 6, as defined by CEN standard EN779—2002. Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of this prerequisite.

## **Environmental Tobacco Smoke Required**

### **Multifamily projects only**

Prohibit smoking in all common areas of the building. The prohibition must be communicated in building rental or lease agreements or in condo or co-op association covenants and restrictions, and provisions for enforcement must be included. Locate any exterior designated smoking areas, including balconies where smoking is permitted, at least 25 feet (7.5 meters) from entries, outdoor air intakes, and operable windows opening to common areas. Prohibit on-property smoking within 25 feet (7.5 meters) of entries, outdoor air intakes, and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property.

## **Compartmentalization Required**

### **Multifamily and Attached Single-Family Projects Only**

Compartmentalize each residential unit to minimize leakage between units. Minimize uncontrolled pathways for environmental tobacco smoke and other indoor air pollutants between units by sealing penetrations in walls, ceilings, and floors and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units. Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway. Weather-strip all exterior doors and operable windows to minimize leakage from outdoors. Demonstrate acceptable sealing of residential units by a blower door test. Follow the procedure described by RESNET or the ENERGY STAR Multifamily High Rise Program Testing and Verification Protocols, Version 1.0, with an allowable maximum leakage of 0.23 cfm<sub>50</sub> per square foot (0.07 cmm<sub>50</sub> per square meter) of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceiling).

## **Enhanced Ventilation 3 Points**

Use one of the following strategies in every bathroom with a shower, bathtub, or spa (i.e., half-baths are exempt) to control the use of the local exhaust fan:

- an occupancy sensor;
- an automatic humidistat controller;
- a continuously operating exhaust fan; or
- a delay timer that operates the fan for at least 20 minutes.

Install a balanced whole-house ventilation system (not just exhaust only or supply only) that meets the minimum ventilation requirements of ASHRAE Standard 62.2–2010, Sections 4 and 7, or local equivalent whichever is more stringent. Program the system such that it does not exceed the standard’s requirements by more than 10%. For multifamily buildings, meet the above requirements for all in-unit residential spaces in both options 1 and 2.

## **Contaminant Control**

### **2 Points**

Design a shoe removal and storage space near the primary entryway, separated from living areas. This space must be a permanent architectural feature and it must be large enough to accommodate a bench and at least two pairs of shoes per bedroom and must not have conventional carpet. Carpet tile is acceptable if it’s specifically designed for entryway systems or similar use, including performance attributes equivalent to other acceptable entryway systems. For multifamily buildings, design a shoe removal and storage space at each residential unit’s primary entrance.

At installation, seal all permanent ducts and vents to minimize contamination from construction. Remove seals after all phases of construction are completed. After construction ends and before occupancy, flush the home with fresh air, according to the following guidelines:

- Remove any dust and debris from ducts.
- Flush the entire home for 48 hours, keeping all windows and interior doors open; the 48 hours may be nonconsecutive if necessary.
- Keep all windows open and run a fan (e.g., HVAC system fan) continuously, or flush the home with all HVAC fans and exhaust fans operating continuously at the highest flow rate.

For multifamily buildings, the requirements apply only to all in-unit spaces. Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of Option 3.

After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline indoor air quality testing using protocols consistent with the methods listed in Table 1. Project teams must follow either the current versions of

ASTM standard methods, EPA compendium methods, or ISO methods, as indicated. Laboratories that conduct the tests for chemical analysis of formaldehyde and volatile organic compounds must be accredited under ISO/IEC 17025 for the test methods they use. Demonstrate that contaminants do not exceed concentration levels listed in Table 1.

Contaminant		Maximum concentration	ASTM and U.S. EPA methods	ISO method	
Particulates	PM10 (for all buildings)	50 µg/m <sup>3</sup> Healthcare only: 20 µg/m <sup>3</sup>	EPA Compendium Method IP-10	ISO 7708	
	PM2.5 (for buildings in EPA nonattainment areas for PM2.5, or local equivalent)	15 µg/m <sup>3</sup>			
Ozone (for buildings in EPA nonattainment areas for Ozone, or local equivalent)		0.075 ppm	ASTM D5149 - 02	ISO 13964	
Carbon monoxide (CO)		9 ppm; no more than 2 ppm above outdoor levels	EPA Compendium Method IP-3	ISO 4224	
Total volatile organic compounds (TVOCs)		500 µg/m <sup>3</sup> Healthcare only: 200 µg/m <sup>3</sup>	EPA TO-1, TO-17, or EPA Compendium Method IP-1	ISO 16000-6	
Formaldehyde		27 ppb Healthcare only: 16.3 ppb	ASTM D5197, EPA TO-11, or EPA Compendium Method IP-6	ISO 16000-3	
Target volatile organic compounds*	1	Acetaldehyde	140 µg/m <sup>3</sup>	ASTM D5197; EPA TO-1, TO-17, or EPA Compendium Method IP-1	ISO 16000-3, ISO 16000-6
	2	Benzene	3 µg/m <sup>3</sup>		
	3	Carbon disulfide	800 µg/m <sup>3</sup>		
	4	Carbon tetrachloride	40 µg/m <sup>3</sup>		
	5	Chlorobenzene	1000 µg/m <sup>3</sup>		
	6	Chloroform	300 µg/m <sup>3</sup>		
	7	Dichlorobenzene (1,4-)	800µg/m <sup>3</sup>		
	8	Dichloroethylene (1, 1)	70 µg/m <sup>3</sup>		
	9	Dimethylformamide (N,N-)	80 µg/m <sup>3</sup>		
	10	Dioxane (1,4-)	3000 µg/m <sup>3</sup>		
	11	Epichlorohydrin	3 µg/m <sup>3</sup>		
	12	Ethylbenzene	2000 µg/m <sup>3</sup>		
	13	Ethylene glycol	400 µg/m <sup>3</sup>		
	14	Ethylene glycol monoethyl ether	70 µg/m <sup>3</sup>		
	15	Ethylene glycol monoethyl ether acetate	300 µg/m <sup>3</sup>		
	16	Ethylene glycol monomethyl ether	60 µg/m <sup>3</sup>		
	17	Ethylene glycol monomethyl ether acetate	90 µg/m <sup>3</sup>		
	19	Hexane (n-)	7000 µg/m <sup>3</sup>		
	20	Isophorone	2000 µg/m <sup>3</sup>		
	21	Isopropanol	7000 µg/m <sup>3</sup>		
	22	Methyl chloroform	1000 µg/m <sup>3</sup>		
	23	Methylene chloride	400 µg/m <sup>3</sup>		
	24	Methyl t-butyl ether	8000 µg/m <sup>3</sup>		
	25	Naphthalene	9 µg/m <sup>3</sup>		
	26	Phenol	200 µg/m <sup>3</sup>		
	27	Propylene glycol monomethyl ether	7000 µg/m <sup>3</sup>		
	28	Styrene	900 µg/m <sup>3</sup>		
	29	Tetrachloroethylene (Perchloroethylene)	35 µg/m <sup>3</sup>		
	30	Toluene	300 µg/m <sup>3</sup>		
	31	Trichloroethylene	600 µg/m <sup>3</sup>		
	32	Vinyl acetate	200 µg/m <sup>3</sup>		
	33-35	Xylenes, technical mixture (m-, o-, p-xylene combined)	700 µg/m <sup>3</sup>		

ppb = parts per billion; ppm = parts per million; µg/cm = micrograms per cubic meter

\*The target volatile organic compounds are from CDPH Standard Method v1.1, Table 4-1. The Maximum concentration limits for these target compounds are the full CREL adopted by Cal/EPA OEHHA in effect on June 2014 <http://oehha.ca.gov/air/allrels.html>.

Conduct all measurements before occupancy but during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the

minimum outside air flow rate for the occupied mode throughout the test. The number of sampling locations depends on the size of the building and number of ventilation systems but must include the entire building and all representative situations. Include areas with the least ventilation and greatest presumed source strength. Collect air samples between 3 and 6 feet (900 and 1 800 millimeters) from the floor to represent the breathing zone of occupants over a minimum four-hour period. Measure particulate concentrations by a gravimetric method. Hand-held or real-time instruments are not acceptable unless they are calibrated on site against the standard gravimetric method. For each sampling point where the concentration exceeds the limit, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met. Refer to CA Section 01350, Appendix B, New Single-Family Residence Scenario, for air-testing guidance.

## **Balancing of Heating and Cooling Distribution Systems**

### **3 Points**

Install a system with at least two space-conditioning zones with independent thermostatic controls. In houses with both a heating system and a cooling system, each must have at least two zones. Single-family houses with less than 800 square feet (74 square meters) of conditioned floor area and multifamily buildings whose average unit size is less than 1,200 square feet (110 square meters) automatically meet the requirements of this credit.

Have the total supply air-flow rates in each room tested using a flow hood with doors closed, or another acceptable method, per RESNET or ACCA Quality Installation Specifications. Supply air-flow rates must be within +/- 20% (or +/- 25 cfm or 11 lps) of calculated values from ACCA Manual J. Test multirate or multispeed HVAC systems at the rate for which they were designed. Supply air-flow requirements must meet the higher of the cooling or heating designed air flow for each room. Ductless systems qualify for this credit.

For each bedroom, demonstrate a pressure difference of less than 3 Pa (0.012 inch w.c.) with respect to the main body of the house when doors are closed and the air handler is operating on highest speed.

## **Enhanced Compartmentalization**

### **1 Point**

Perform a compartmentalization blower door test according to RESNET or the ENERGY STAR testing and verification protocols for multifamily midrise buildings, with an allowable maximum leakage of 0.15 cfm<sub>50</sub> per square foot (0.04 cmm<sub>50</sub> per square meter) of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceiling).

## **Enhanced Combustion Venting**

### **2 Points**

Install whole-house electric and gas meters, as applicable. Encourage homeowners or tenants to share energy usage data with USGBC via a USGBC-approved third-party by describing the benefits of participation in the Homeowner Education Manual.

## **Enhanced Garage Pollutant Protection**

### **1 Point**

Install in the garage an exhaust fan that is rated at least 75 cfm (35 liters per second) and meets ENERGY STAR cfm/w performance requirements. The fan must vent directly to the outdoors and have an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent. The timer must be set to provide at least three air changes each time the fan is turned on. Projects that earn the EPA Indoor airPLUS label automatically meet the requirements of Option 1.

## **Low Emitting Products**

### **3 Points**

In the interior of the home, use products that have been tested and found compliant with the California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B, New Single-Family Residence Scenario, for emissions testing guidance. At least 90% of a component must meet the requirements to earn credit.

- For site-applied interior paints and coatings, meet the requirements of CA Section 01350 (0.5 point).
- For flooring, meet the requirements of CA Section 01350 (0.5 point).
- For insulation, meet the requirements of CA Section 01350 (0.5 point).
- For site-applied adhesives and sealants, meet the requirements of CA Section 01350 (0.5 point).
- For composite wood products be constructed from materials documented to have low formaldehyde emissions that meet the California Air Resources Board requirements for ultra-low-emitting formaldehyde (ULEF) resins or no-added formaldehyde based resins. Salvaged and reused architectural millwork more than one year old at the time of occupancy is considered compliant provided any site-applied paints, coatings, adhesives, and sealants meet the requirements. Wood structural panels conforming to DOC PS-1 or PS-2 and manufactured with moisture-resistant adhesive for "Exposure 1" or "Exterior" application as indicated on the panel by the trademark of an approved testing and grading agency are exempt. (1 point) .

## **Innovation**

### **Preliminary Rating Required**

As early as practicable, conduct a preliminary LEED for Homes meeting. As part of the meeting, create an action plan that identifies the following:

- the targeted LEED award level (Certified, Silver, Gold, or Platinum);
- the credits that have been selected to meet the targeted award level; and
- the party accountable for meeting the requirements for each selected credit.

### **Innovation 5 Points**

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance credits.

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED Green Building Rating System. Identify the following in writing:

- the intent of the proposed innovation credit;
- the proposed requirement for compliance;
- the proposed submittals to demonstrate compliance; and
- the design approach (strategies) used to meet the requirements.

Attempt and achieve one pilot credit from the USGBC's LEED Pilot Credit Library.

- Innovation (1–3 points) Defined in Option 1 above.
- Pilot (1–3 points) Defined in Option 2 above.
- Exemplary Performance (0.5–2 points) Achieve exemplary performance in an existing LEED v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 edition. An exemplary performance point is typically earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit.

### **LEED AP Homes 1 Point**

At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.