LEED for Homes Pilot for Mid-rise Multi-family Buildings in California Program Guidelines, Version 1.1

This document describes the LEED for Homes program as it applies to mid-rise multi-family buildings in California. The relevance of LEED for Homes for mid-rise buildings is still the subject of investigation, and the purpose of this pilot is to better understand the suitability of LEED for Homes for mid-rise projects. A decision about the long-term plans for mid-rise buildings will be made at the close of the pilot, which is scheduled for summer 2009.

Any and all mid-rise multi-family projects are welcome to participate as long as the eligibility requirements below are met. Project managers should be aware that this pilot is part of an evaluation effort for mid-rise buildings, and they are asked to be flexible, maintain regular communication with their Provider, and document any and all challenges, complications, etc. associated with the LEED for Homes program requirements.

Changes from the LEED for Homes Rating System

The guidance and requirements in this document build upon the LEED for Homes 2008 Rating System, available on the USGBC website. In the schematics that precede each section, the dark green shaded boxes (e.g. ID 2) refer to credits that are already described in the national LEED for Homes Rating System and are not changed for mid-rise buildings. The light green shaded boxes (e.g. EA credit 1) refer to credits that have been customized for mid-rise projects. These credits are presented in more detail in the following pages.

Changes from the national Mid-rise Pilot Program Guidelines

This document mirrors the Mid-rise Pilot Program Guidelines used by project teams throughout the country. The only substantive differences for California are found in the EA section, which entirely replaces the EA section for projects outside of California.

Eligibility and applicability

Any projects interested in being part of the LEED for Homes pilot for mid-rise buildings must contract with a LEED for Homes Provider and submit an informal request for participation to the LEED for Homes Program Director prior to construction.

Buildings in the LEED for Homes mid-rise multi-family pilot must meet the following criteria:

- Each project must register through a designated LEED for Homes Provider.
- At least 50% of the occupied space must be residential. If more than 50% of the occupied spaces is non-residential, the building must pursue LEED for New Construction (LEED-NC) certification. Mixed-use buildings are subject to the LEED for Homes policy on mixed-used spaces.
- The building must include 4-6 above-grade occupiable stories. A building with fewer than 4 above-grade stories must pursue certification using the standard LEED for Homes Rating System. Any occupiable space, including commercial space, should

be counted toward the number of stories except garages, basements, or cellars.[1] A partial story should be counted if 20% or more of the space is occupiable.[2]

- The building must include at least 2 living units. A building that contains only one living unit is considered a single-family home and must use the standard LEED for Homes Rating System.

Buildings that pursue LEED for Homes certification through this pilot can also pursue LEED-NC certification. Buildings pursuing LEED for Homes certification are encouraged to also pursue ENERGY STAR labeling in regions that have active pilot programs such as California, New York, and Wisconsin.

Evaluating LEED-NC

As part of this pilot initiative, USGBC is interested in understanding not only how well or poorly mid-rise residential buildings fit with LEED for Homes, but also how well or poorly these buildings fit with LEED-NC. Pursuant to that goal, each mid-rise project team must evaluate the appropriateness of LEED-NC. In particular, project teams must answer the following questions:

- If the project had pursued LEED-NC, how many points would have been earned and what certification level would have been achieved?
- Which LEED-NC prerequisites would have been achieved? Which would have been a problem?
- What would be the cost implications of pursuing LEED-NC instead of the LEED for Homes pilot for mid-rise building?
- What other barriers prevented or dissuaded the project from pursuing LEED-NC certification?

This evaluation must be submitted to USGBC – a form will be provided – but it does not require that the project team register for LEED-NC or undergo any formal LEED-NC certification steps.

Sampling

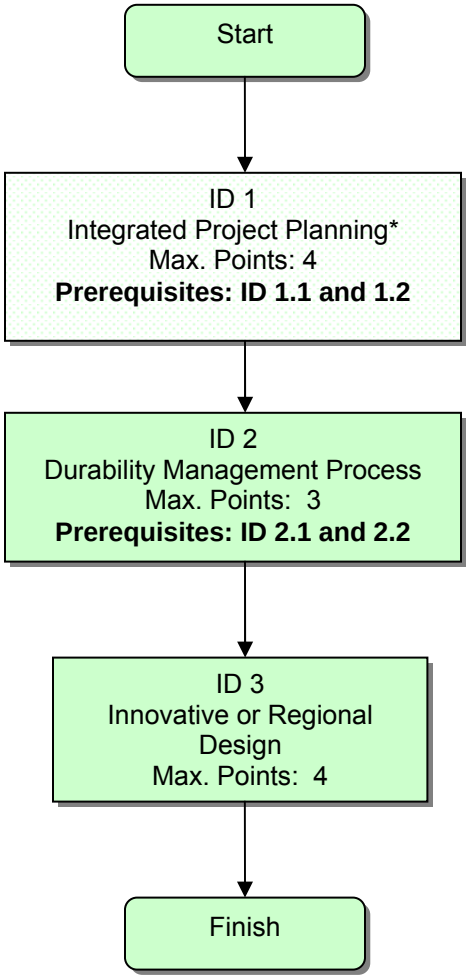
Mid-rise buildings may use the LEED for Homes Multi-family Sampling Protocol when it becomes available.

[1] Even conditioned basements or cellars should not be counted as "stories".

[2] If a project has more than 20% occupied space on a garage level, the project may appeal to USGBC for inclusion in the mid-rise pilot. However, these projects are encouraged instead to pursue LEED-NC.

Innovation & Design Process (ID)

Pathway through the ID Category
in Mid-rise Multi-family Buildings



***** *Please see revised ID credits for Mid-rise Buildings*

ID 1. Integrated Project Planning *in Mid-rise Buildings*

Maximum points: 4

Intent

Maximize opportunities for integrated, cost-effective adoption of green design and construction strategies.

Requirements

Prerequisite

1.1 **Preliminary Rating.** As early as practical, conduct a preliminary LEED for Homes meeting, with the participation of the Provider and key members of the project team. As part of the meeting, create an action plan that identifies the following:

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

1.2 **Energy Expertise in MID-RISE.** Each project team must include at least the following set of expertise:

- An individual familiar with mid-rise energy systems and components, including mechanical equipment, envelope upgrades, etc. Experience with green mid-rise or high-rise residential buildings is preferred.
- An individual with experience performing energy modeling per California Title-24 for mid-rise multi-family buildings. Experience with LEED-NC energy modeling is valuable.

Credits

1.3 **Professional Credentialed with Respect to LEED for Homes** (1 point). At least one principal member of the project team shall be a professional who is credentialed with respect to LEED for Homes as determined by the U.S. Green Building Council. *This credit is unavailable until further notice from USGBC.*

1.4 **Design Charrette** (1 point). No later than the design development phase and preferably during schematic design, conduct at least one full-day integrated design workshop with the project team defined in ID 1.2. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants.

1.5 **Building Orientation for Solar Design** (1 point). Design the home such that all of the following requirements are met:

a) The glazing area on the north- and south-facing walls of the building is at least 50% greater than the sum of the glazing area on the east- and west- facing walls.

b) The east-west axis of the building is within 15 degrees of due east-west.

c) The roof has a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications.

d) At least 90% of the glazing on the south-facing wall is completely shaded (using shading, overhangs, etc.) at noon on June 21 and unshaded at noon on December 21.

1.6 **Trades Training for MID-RISE** (1 point). Before construction begins, but after trades have been hired for the project, hold a full day kick-off workshop focusing on the green or otherwise unusual aspects of the project and the expectations for ensuring certification. Include at least the following trades:

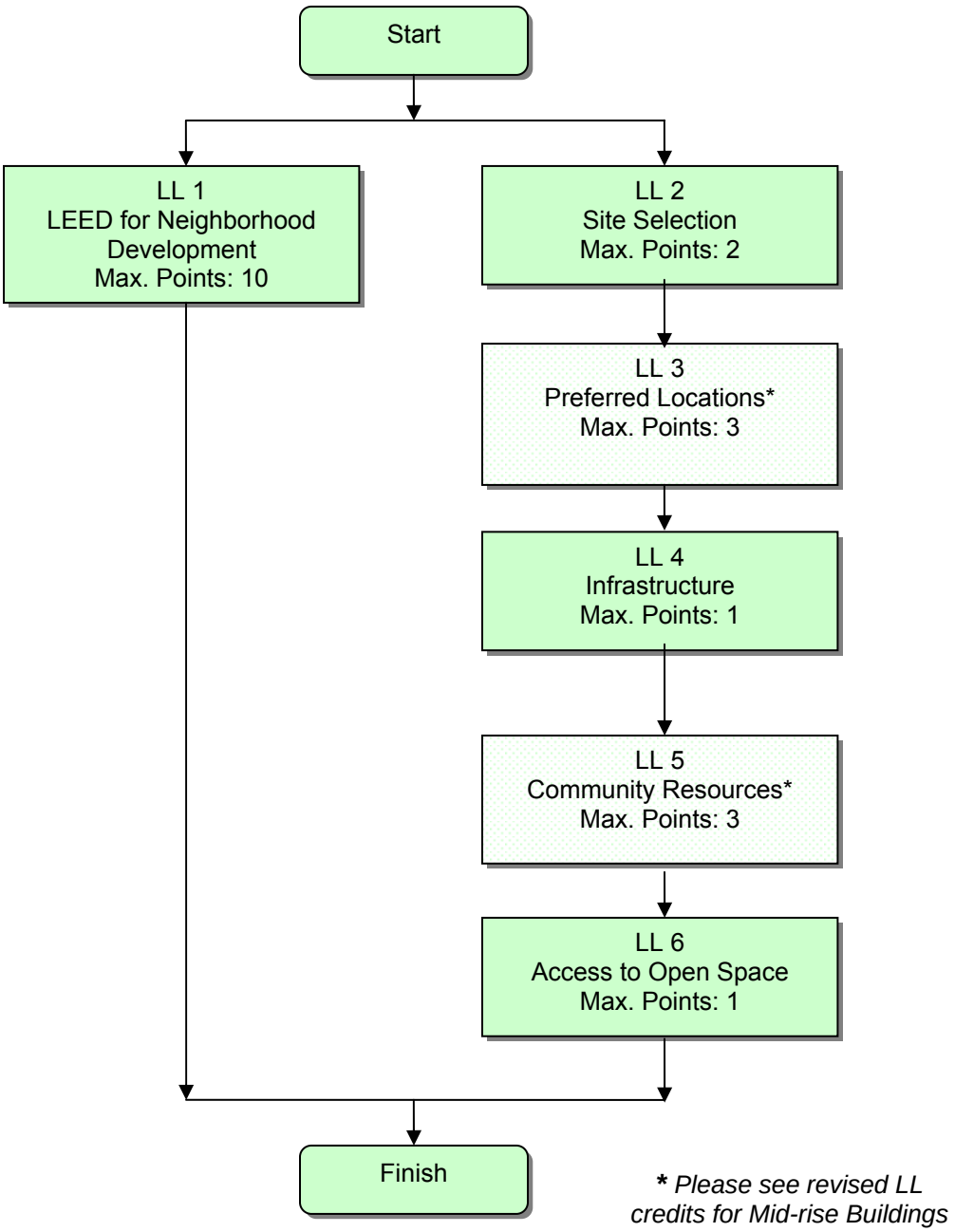
- Plumbing
- Mechanical systems
- Insulation
- General contracting

Synergies and Trade-Offs

This credit is intended to promote an integrated, system-oriented approach to green project design and development. The selected green homebuilding strategies and technologies in the Rating System should each be fully integrated into a home's design.

Location & Linkages (LL)

Optional Pathways through the LL Category
in Mid-rise Multi-family Buildings



***** *Please see revised LL credits for Mid-rise Buildings*

LL 3. Preferred Locations *in Mid-rise Buildings*

Maximum points: 3

Intent

Encourage the building of LEED mid-rise buildings near or within existing communities.

Requirements

Prerequisites

None.

Credits

3.1 **Edge Development** (1 point). Select a lot such that at least 25% of the perimeter immediately borders previously developed land. In the case of a multi-building new development, each mid-rise building in the development is awarded this point if at least 25% of the development site immediately borders previously developed land.

OR

3.2 **Infill** (2 points). Select a lot such that at least 75% of the perimeter immediately borders previously developed land. In the case of a multi-building new development, each mid-rise building in the development is awarded these points if at least 75% of the development site immediately borders previously developed land.

AND/OR

3.3 **Brownfield Redevelopment for MID-RISE** (1 point). Build on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment or a local Voluntary Cleanup Program) OR on a site defined as a brownfield by a local, state or federal government agency.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

LL 5. Community Resources *in Mid-rise Buildings*

Maximum points: 3

Intent

Encourage the building of LEED mid-rise buildings in development patterns that allow for walking and biking to community resources (thereby minimizing dependency on personal automobiles and their associated environmental impacts).

Requirements

Prerequisites

None.

Credits

5.1 **Basic Community Resources for MID-RISE** (1 point). Select a site that meets one of the following criteria:

a) Located within ¼ mile of four basic community resources (Table 1).

b) Located within ½ mile of seven basic community resources (Table 1).

OR

5.2 **Extensive Community Resources for MID-RISE** (2 points). Select a site that meets one of the following criteria:

a) Located within ¼ mile of seven basic community resources (Table 1).

b) Located within ½ mile of 11 basic community resources (Table 1).

OR

5.3 **Outstanding Community Resources for MID-RISE** (3 points). Select a site that meets one of the following criteria:

a) Located within ¼ mile of 11 basic community resources (Table 1).

b) Located within ½ mile of 14 basic community resources (Table 1).

Table 1.
Types of Basic Community Resources

- ☐ Arts and entertainment center
- ☐ Bank
- ☐ Community or civic center
- ☐ Convenience store
- ☐ Daycare center
- ☐ Fire station
- ☐ Fitness center or gym
- ☐ Laundry or dry cleaner
- ☐ Library
- ☐ Medical or dental office
- ☐ Pharmacy
- ☐ Police station
- ☐ Post office
- ☐ Place of worship
- ☐ Restaurant
- ☐ School
- ☐ Supermarket
- ☐ Other neighborhood-serving retail
- ☐ Other office building or major employment center

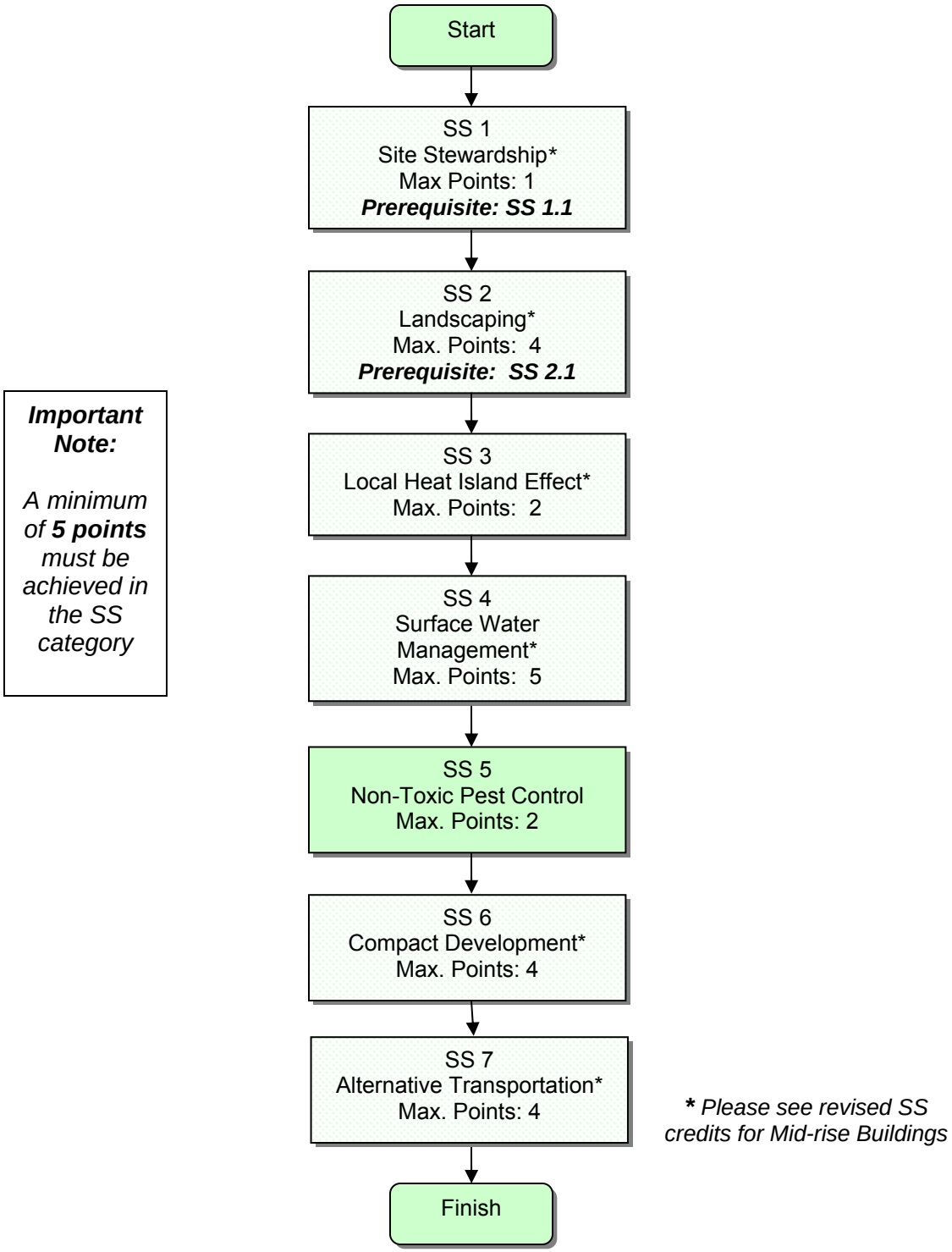
Note: Up to two of each type of community resource may be counted. For example, two restaurants within ¼ mile may be counted as two community resources; four restaurants also count as two.

Synergies and Trade-Offs

A project receiving points for LL 1 is not eligible for points under LL 2-6, and vice versa.

Sustainable Sites (SS)

Pathway through the SS Category
in Mid-rise Multi-family Buildings



SS 1. Site Stewardship *in Mid-rise Buildings*

Maximum points: 1

Intent

Minimize long-term environmental damage to the building lot during the construction process.

Requirements

Prerequisites

1.1 **Erosion Controls During Construction.** Prior to construction, design and plan appropriate erosion control measures. During construction, implement these measures. Erosion control measures must include all of the following:

a) Stockpile and protect disturbed topsoil from erosion (for reuse).

b) Control the path and velocity of runoff with silt fencing or comparable measures.

c) Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.

d) Provide swales to divert surface water from hillsides.

e) If soils in a sloped area (i.e., 25%, or 4:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or some comparable approach to keep soil stabilized.

Credits

1.2 **Minimize Disturbed Area of Site for MID-RISE** (1 point). Minimize disturbance to the site by meeting the following:

Where the site is not previously developed:

a) Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot (see Note 1 below).

b) Leave undisturbed at least 40% of the buildable lot area, not including area under roof. Only softscapes can be counted toward this credit; projects cannot receive credit for preserving preexisting hardscapes, such as driveways.

OR

Where the site is previously developed:

c) Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot (see Note 1 below), and rehabilitate the undisturbed portion of the lot by undoing any previous soil compaction, removing existing invasive plants, and meeting the requirements of SS 2.2 (see Note 2, below).

OR

d) Build with housing density for the project that is equal to or greater than 40 units per acre. The average lot size shall be calculated as the total lot size divided by the number of units.

Notes: 1. *Any "no-disturbance" zones must also be protected from parked construction vehicles and building material storage. Soils compacted by vehicles or stored materials can cause major difficulties in establishing any new landscaping.*

2. *Homes on previously developed lots that disturb the entire lot during construction can earn this credit by meeting the requirements in part (c) above.*

Synergies and Trade-Offs

SS 4.2 rewards homes for the installation of permanent erosion controls.

If the project does not include full landscaping, then homeowner association, condo/coop association, or other rules or covenants must require homeowners to have the site fully landscaped within one year; see SS 2. Erosion controls and soil stabilization measures must be robust enough to function until landscaping is in place (i.e., up to one year).

SS 2. Landscaping *in Mid-rise Buildings*

Maximum points: 3

Intent

Design landscape features to avoid invasive species and minimize demand for water and synthetic chemicals.

Requirements

Prerequisites

2.1 **No Invasive Plants.** Introduce no invasive plant species into the landscape.

Note: Invasive plant species vary by region. Consult the local Cooperative Extension Service or state agencies. A list of regional resources is available from the U.S. Department of Agriculture, at www.invasivespeciesinfo.gov/unitedstates/state.shtml. Not all nonnative species are considered invasive.

Credits

Note: Points shown below are for homes that are fully landscaped. A project that has not completed the designed landscaping may earn up to 50% of the points for each credit as long as 50% or more of the designed landscaping is completed upon certification. In this case, 100% completion of the landscaping must be required by homeowner association or other rules within a specific time period not to exceed one year after occupancy. Erosion controls and soil stabilization measures must be robust enough to be effective for one year. The builder or project team must also develop a landscaping plan that meets the requirements in SS 2 and provide it to the homeowner.

2.2 **Basic Landscape Design** (1 points). Meet the following requirements for all designed landscape softscapes:

a) Any turf must be drought-tolerant.
b) Do not use turf in densely shaded areas.
c) Do not use turf in areas with a slope of 25% (i.e., 4:1 slope).
d) Add mulch or soil amendments as appropriate.
   Mulch is defined as a covering placed around plants to reduce erosion and water loss and to help regulate soil temperature. In addition, upon decomposition, organic mulches serve as soil amendments. The type of mulch selected can affect soil pH.
e) All compacted soil (e.g., from construction vehicles) must be tilled to at least 6 inches."

2.3 **Limit Conventional Turf for MID-RISE** (maximum 2 points, as specified in Table 2). Limit the use of conventional turf in the designed landscape softscapes.

AND/OR

2.4 **Drought-Tolerant Plants for MID-RISE** (1 point). Both points must be earned under SS 2.3 in order to earn this credit. Install drought-tolerant plants such that at least 90% of the installed plants are drought-tolerant.

OR

2.5 **Reduce Overall Irrigation Demand by at Least 20% for MID-RISE** (maximum 3 points, as specified in Table 3). Design the landscape and irrigation system to reduce overall irrigation water usage. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below. A project earning points for SS 2.5 cannot earn points for SS 2.3 or SS 2.4.

Table 2. Limited Conventional Turf

Percentage of designed landscape softscape area that is conventional turf	*Points*
21–40%	1
20% or less	2

Table 3. Reduction in Water Demand

Reduction in estimated irrigation water usage	*SS 2.5 points*	*WE 2.2 points*	*Total points*
20–24%	1	0	1
25–29%	1.5	0	1.5
30–34%	2	0	2
35–39%	2.5	0	2.5
40–44%	3	0	3
45–49%	3	0.5	3.5
50–54%	3	1	4
55–59%	3	1.5	4.5
60% or more	3	2	5

Synergies and Trade-Offs

A project receiving points in SS 2.5 should also refer to WE 2.2.

Any measures chosen in SS 2 should be integrated with irrigation system design, which is addressed in WE 2. Rainwater and graywater reuse systems (WE 1) should also be included in landscaping design.

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage = Landscaped Area * ET_0 * 0.62

where ET_o = Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ET_L ÷ IE) * CF * 0.62

where $ET_L = ET_0 * K_L$ and $K_L = K_S * K_{MC}$. Refer to Tables 4 and 5 for values for K_S and K_{MC}, and to Table 6 for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to Table 3, above, to determine points earned.

Table 4. Species Factor

Vegetation type	*Species factor (K_S)*		
	Low	*Average*	*High*
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 5. Microclimate Factor

Example microclimate impacts	*Microclimate factor (K_{MC})*		
	Low	*Average*	*High*
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 6. Irrigation Efficiency

Irrigation type	*Irrigation efficiency (IE)*	
	Low	*High*
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

SS 3. Local Heat Island Effects *in Mid-rise Buildings*

Maximum points: 2

Intent

Design landscape features and choose roofing materials to reduce local heat island effects.

Requirements

Prerequisites

None.

Credits

3.1 **Reduce Site Heat Island Effects for MID-RISE** (1 point). Do one of the following:

a) Locate trees or other plantings to provide shading for at least 50% of the site hardscapes (including sidewalks, patios, courtyards, driveways, or parking decks). Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years' growth.

b) Install light-colored, high-albedo materials or vegetation for at least 50% of the site hardscapes (including sidewalks, patios, courtyards, driveways, or parking decks). Acceptable strategies include the following:

i. white concrete;

ii. open pavers (counting only the vegetation, not the pavers); and

iii. any material with a solar reflectance index (SRI) of at least 29.

3.2 **Reduce Roof Heat Island Effects for MID-RISE** (1 point). Do one of the following:

a) Use roofing materials having an SRI equal to or greater than the values in Table 7 below for a minimum of 75% of the roof surface.

b) Install a vegetated roof for at least 50% of the roof area.

c) Install high albedo and vegetated roof surfaces that, in combination, meet the following criteria:

(Area of high-albedo roof / 0.75) + (Area of vegetated roof / 0.5) ≥ Total roof area

Table 7. SRI values for Roofs

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

Synergies and Trade-Offs

Shading hardscapes can reduce irrigation needs. Shading and reducing heat absorption by the building can temper the building's outdoor environment and reduce cooling loads.

Providing shade is addressed in EA 1.3 (Optimize Energy Performance). A vegetated roof can also be used as a strategy for achieving SS 4.3 (Stormwater Quality Control). Locating fences, trees, shrubs or other plantings appropriately can capture or deflect seasonal breezes.

SS 4. Surface Water Management *in Mid-rise Buildings*

Maximum points: 5

Intent

Design site features to minimize erosion and runoff from the building site.

Requirements

Prerequisites

None.

Credits

Note: Certain surface water management strategies may be regulated, restricted, or even prohibited by local water authorities or code requirements.

4.1 **Permeable Lot for MID-RISE** (maximum 2 points, as specified in Table 8). Design the lot such that at least 70% of the built environment, not including area under roof, is permeable or designed to capture water runoff for infiltration on-site. Area that can be counted toward the minimum includes the following:

a) Vegetative landscape (e.g., grass, trees, shrubs).

b) Permeable paving, installed by an experienced professional. Permeable paving must include porous above-ground materials (e.g., open pavers, engineered products) and a 6-inch porous subbase, and the base layer must be designed to ensure proper drainage away from the home.

c) Impermeable surfaces that are designed to direct all runoff toward an appropriate permanent infiltration feature (e.g., vegetated swale, on-site rain garden, or rainwater cistern).

4.2 **Permanent Erosion Controls** (1 point). Design and install one of the following permanent erosion control measures:

a) If portions of the lot are located on a steep slope, reduce long-term runoff effects through use of terracing and retaining walls.

OR

b) Plant one tree, four 5-gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed lot area (including area under roof).

4.3 **Stormwater Quality Control for MID-RISE** (2 points). Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs).

BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership [TARP], Washington State Department of Ecology) for BMP monitoring.

Table 8. Permeable Area

Percentage of buildable lot (excluding area under roof) that is permeable	*Points*
70–79%	0.5
80–89%	1
90–99%	1.5
100%	2

Synergies and Trade-Offs

SS 1.1 addresses erosion control during construction. Materials used to reduce imperviousness and promote infiltration can also reduce heat island effects in SS 3 (e.g., vegetated roof and lot).

Trees, shrubs or groundcover installed for erosion control can be designed as drought-tolerant or otherwise preferable; see SS 2 for more information on landscaping. Conventional turf is less permeable than other plantings and consequently less effective at managing runoff.

SS 6. Compact Development *in Mid-rise Buildings*

Maximum points: 4

Intent

Make use of compact development patterns to conserve land and promote community livability, transportation efficiency, and walkability.

Requirements

Prerequisites

None.

Credits

6.1 **Moderate Density for MID-RISE** (2 points). Build homes with an average housing density of 10 or more dwelling units per acre of buildable land.

OR

6.2 **High Density for MID-RISE** (3 points). Build homes with an average housing density of 20 or more dwelling units per acre of buildable land.

OR

6.3 **Very High Density for MID-RISE** (4 points). Build homes with an average housing density of 40 or more dwelling units per acre of buildable land.

Note: Buildable land area is calculated as follows:

- *Exclude public streets or public rights of way, land occupied by nonresidential structures, public parks, and land excluded from residential development by law.*
- *For multiple-lot developments, include only the sum of the lot areas for mid-rise buildings being built for LEED for Homes.*
- *The numerator is the number of housing units in the project and the denominator is the buildable land area included in the project (subject to the above exclusions). Both relate to the project only, not the surrounding area.*

SS 7. Alternative Transportation *in Mid-rise Buildings*

Maximum points: 4

Intent

Reduce pollution and land development impacts from automobile use, especially single occupancy vehicle use.

Requirements

Prerequisites

None.

Credits

7.1 **Public Transit** (maximum 2 points). Meet one of the following:

a) Locate project within ½ mile of transit services that offer 30 or more transit rides per weekday (combined bus, rail, and ferry). (1 point)

b) Locate project within ½ mile of transit services that offer 60 or more transit rides per weekday (combined bus, rail, and ferry). (2 points)

Transit rides per weekday are calculated as follows: (1) within a ½ mile radius, count all the transit stops; (2) multiply each transit stop by the number of buses, trains, and ferries that pass through that stop per day; (3) add the total number of rides available at each stop within ½ mile together. Example: if there are 4 bus stops, and at each bus stop the service frequency is half-hourly (48 times per day), the total transit rides per day is 192.

7.2 **Bicycle Storage** (1 point). Provide covered storage facilities for securing bicycles for 15% or more of building occupants. Expect 2 persons for a studio or 1-bedroom apartment, with one additional person per additional bedroom.

7.3 **Parking Capacity / Low Emitting and Fuel-Efficient Vehicles** (1 point). Provide one of the following:

a) Low-emitting and fuel-efficient vehicles for 3% of the total vehicle parking capacity and provide preferred parking for these vehicles.

b) Preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

c) Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site (liquid or gaseous fueling facilities must be separately ventilated or located outdoors).

d) Size parking capacity to not exceed minimum local zoning requirements, AND, provide infrastructure to facilitate shared vehicle usage such as carpool drop-off areas, designated parking for vanpools, or car-share services, ride boards, and shuttle services to mass transit.

e) Provide no new parking.

For the purposes of this credit, low-emitting and fuel-efficient vehicles are defined as vehicles that are either classified as Zero Emission Vehicles (ZEV) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

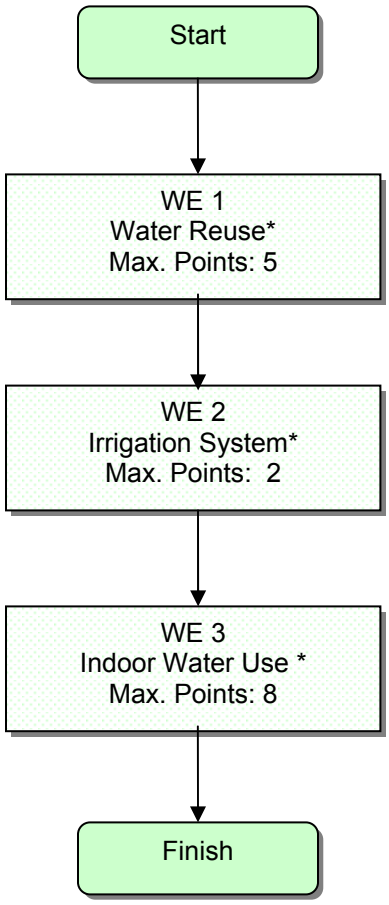
“Preferred parking” refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price.

Water Efficiency (WE)

Pathway through the WE Category
in Mid-rise Multi-family Buildings

Important Note:

*A minimum of **3 points** must be achieved in the WE category*



***** *Please see revised WE credits for Mid-rise Buildings*

WE 1. Water Reuse *in Mid-rise Buildings*

Maximum points: 5

Intent

Use municipal recycled water, or offset central water supply through the capture and controlled reuse of rainwater and/or graywater.

Requirements

Prerequisites

None.

Credits

Note: Rainwater and graywater capture systems are subject to local codes and may require special permits. Note that the water quality should meet local standards and consult manufacturers' recommendations to determine the compatibility of plumbing fixtures with graywater. Many states and regulatory agencies require that water going into a toilet or sink meet potable water standards; builders should comply with local codes.

1. **Water Reuse for MID-RISE** (maximum of 5 points, as specified in Table 9). Design and install systems so that ≥10% of total water demand (landscape irrigation and indoor water use combined) is offset by water reuse strategies, including any combination of the strategies listed below. Estimates must be calculated and prepared by a qualified professional using the method outlined below.

   a) Rainwater Harvesting System. Design and install a rainwater harvesting and storage system (including surface runoff and/or roof runoff)

   b) Graywater Reuse System. Design and install a graywater reuse system. Graywater may be collected from any of the following:

      - clothes washers;
      - showers;
      - faucets and other sources.

   c) Municipal Recycled Water System. Design the plumbing such that the irrigation system water demand is supplied by municipal recycled water. This is applicable only in communities with a municipal recycled water program.

Table 9. Water Reuse

Percentage of total water demand supplied by water reuse strategies	*Points*
≥ 10%	1
≥ 20%	2
≥ 30%	3
≥ 40%	4
≥ 50%	5

Method for Calculating the Percent of Water Reuse

Step 1. Calculate Total Indoor Water Use for one month for the entire building for the following sources: toilets, bathroom sinks, kitchen sinks, showers, clothes washing, and dish washing. Assumptions for the calculation are given in Tables 10-1 and 10-2 below.

For fixture flow rates and appliance water consumption, use information provided by the manufacturer. If units have different fixtures and appliances, calculate water usage for *each* unit and sum the water use over *all* units. If the water usage for fixtures, fittings, and appliances are unknown, use default values in Table 11 below.

Step 2. Calculate Outdoor Water Use. Use either of the following approaches:

a) Design Case Usage, calculated using project information for the landscape and irrigation system. Use the methodology in this guidance for WE Credit 2.2, Step 2.

OR

b) Default Usage, calculated according to the following equation:

Default Usage = Landscaped Area * ET_0 * 0.62,

Where: Landscaped Area is the square footage of landscape softscapes and ET_0 is the average evapotranspiration rate in inches for the month of July.

Step 3. Calculate Total Water Demand:

Total Water Demand = Total Indoor Water Use + Outdoor Water Use

Step 4. Estimate the total monthly reused water for each of the following water reuse methods, as applicable to the project. Sum the volumes of water provided by graywater collection, rainwater collection, and municipal recycled water for the Total Water Reuse.

a) For graywater collection, predict the volume using the values calculated in Step 1 for each fixture or appliance providing graywater.

b) For rainwater collection, use historical average precipitation for *EITHER*

I. the month of July

OR

II. each month in order to predict the volume of water to be expected in the storage cistern at the beginning of July, and the volume collected during July.

c) For municipal recycled water, predict the volume using the agreement with the recycled water provider.

Note: The amount of water reused cannot exceed the water usage being offset. For example, if a graywater system is designed to collect 5,000 gallons of water from showerheads, but the water will only be reused in toilets with a monthly demand of 2,000 gallons, the Total Water Reuse should be 2,000 gallons per month, not 5,000 gallons.

Step 5. Calculate the Percent of Water Reuse:

Percent Water Reuse = Total Reused Water ÷ Total Water Demand * 100%

Table 10-1. Indoor Water Usage Assumptions & Sample Calculator for Fixtures & Fittings

Flush Fixture	*Monthly uses per resident*	*Building residents*[3]	*Flowrate (GPM or GPF)*	*Duration*	*Monthly water use (gal)*
Toilet	150			1 flush	
Bathroom Sink	150			0.25 min.	
Kitchen Sink	120			1 min.	
Shower	30			5 min.	
*Where monthly water use = monthly uses per resident * residents * flowrate * duration*					

Table 10-2. Indoor Water Usage Assumptions & Sample Calculator for Appliances

Appliance	*Monthly uses per unit*	*Number of units in the building*	*Water consumption per use (gal)*	*Monthly water use (gal)*
Dishwasher*	16			
Clothes washer**	30			
*Where monthly water use = monthly uses per unit * units * consumption per unit*				

* For each unit without a dishwasher, add 96 gal per month to account for washing by hand.
** If there are clothes washers in the building, this calculation should still be completed, even if the clothes washers are not in each unit.

Table 11. Default Water Usage Values

Fixture or Appliance	*Default Flowrate or Water Consumption*
Toilet	1.6 gal/flush
Bathroom Sink	2.5 gal/minute
Kitchen Sink	2.5 gal/minute
Shower	2.5 gal/minute
Dishwasher	6 gal/cycle
Clothes washer	40 gal/load

Synergies and Trade-Offs

Reused water used for irrigation systems should be integrated with resource-efficient landscape (SS 2) and irrigation system design (WE 2). Rainwater harvesting can be used for stormwater quality control (SS 4.3)

[3] For the number of residents in each unit, expect 2 persons for a studio or 1-bedroom apartment, with one additional person per additional bedroom.

WE 2. Irrigation System *in Mid-rise Buildings*

Maximum points: 2

Intent

Minimize outdoor demand for water through water-efficient irrigation.

Requirements

Prerequisites

None.

Credits

Note: Points shown below are for irrigation systems installed throughout the designed landscape. If only 50% of the designed landscape includes these measures, then only 50% of the points are available. Even if part of the yard is not landscaped, the irrigation system must be stubbed to that part of the yard, as appropriate.

2.1 **High-Efficiency Irrigation System for MID-RISE** (0.5 point each, maximum 2 points). Design and install a high-efficiency irrigation system (based on overall landscaping plans, including measures adopted in SS 2) such that any of the following are met:

a) Install an irrigation system designed by an EPA Water Sense certified professional.

b) Design and install an irrigation system with head-to-head coverage.

c) Install a central shut-off valve.

d) Install a submeter for the irrigation system.

e) Use drip irrigation for at least 50% of landscape planting beds to minimize evaporation.

f) Create separate zones for each type of bedding area based on watering needs.

g) Install a timer or controller that activates the valves for each watering zone at the best time of day to minimize evaporative losses while maintaining healthy plants and obeying local regulations and water use guidance.

h) Install pressure-regulating devices to maintain optimal pressure and prevent misting.

i) Utilize high-efficiency nozzles with an average distribution uniformity (DU) of at least 0.70. This may include conventional rotors, multistream rotors, or high-efficiency spray heads, but the DU must be verified by manufacturer documentation or third-party tests. A point source (drip) irrigation system should be counted as having a DU of 0.80.

j) Check valves in heads.

k) Install a moisture sensor controller or rain delay controller. For example, “smart" evapotranspiration controllers receive radio, pager, or Internet signals to direct the irrigation system to replace only the moisture that the landscape has lost because of heat, wind, etc.

l) Perform a third-party inspection of the irrigation system in operation, including observation of all of the following:

i. All spray heads are operating and delivering water only to intended zones.

ii. Any switches or shut-off valves are working properly.

iii. Any timers or controllers are set properly.

iv. Any irrigation systems are located at least 2 feet from the building

v. Irrigation spray does not hit the building.

OR

2.2 **Reduce Overall Irrigation Demand by at Least 45% for MID-RISE**(maximum 2 points, as specified in Table 12). Design the landscape and irrigation system to reduce the overall irrigation water demand water budget. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below. A project earning points for WE 2.2 cannot earn points for WE 2.1.

Note: A project must earn full points in SS 2.5 before receiving points for this credit.

Table 12. Reduction in Water Demand

Reduction in estimated irrigation water usage	*WE 2.2 points*	*SS 2.5 points*	*Total points*
45–49%	0.5	3	3.5
50–54%	1	3	4
55–59%	1.5	3	4.5
60% or more	2	3	5

Synergies and Trade-Offs

A project receiving points for WE 2.2 must achieve full points in SS 2.5.

The irrigation system design must take into consideration all aspects of the landscape design, including any features from SS 2, as well as any rainwater harvesting or graywater reuse system (WE 1).

Method for Calculating Reduction in Irrigation Demand

Step 1. Calculate the baseline irrigation water usage:

Baseline Usage = Landscaped Area * ET_0 * 0.62

where ET_o = Baseline Evapotranspiration Rate (available from local and state Departments of Agriculture)

Step 2. Calculate the design case irrigation water usage:

Design Case Usage = (Landscaped Area * ET_L ÷ IE) * CF * 0.62

where $ET_L = ET_0 * K_L$ and $K_L = K_S * K_{MC}$. Refer to Tables 13 and 14 for values for K_S and K_{MC}, and to Table 15 for values for IE. For CF, use estimated value based on manufacturer's specifications for percentage water savings.

Step 3. Calculate the percentage reduction in irrigation water usage:

Percentage Reduction = (1 – Design Case Usage ÷ Baseline Usage) * 100

Step 4. Refer to Table 11, above, to determine points earned.

Table 13. Species Factor

Vegetation type	*Species factor (K_S)*		
	Low	*Average*	*High*
Trees	0.2	0.5	0.9
Shrubs	0.2	0.5	0.7
Groundcover	0.2	0.5	0.7
Turf	0.6	0.7	0.8

Table 14. Microclimate Factor

Example microclimate impacts	*Microclimate factor (K_{MC})*		
	Low	*Average*	*High*
Shading	0.5	0.8	1.0
High sun exposure	1.0	1.2	1.5
Protection from wind	0.8	0.9	1.0
Windy area	1.0	1.2	1.5

Table 15. Irrigation Efficiency

Irrigation type	*Irrigation efficiency (IE)*	
	Low	*High*
Fixed spray	0.4	0.6
Impact and microspray	0.5	0.7
Rotors	0.6	0.8
Multistream rotators	0.6	0.8
Low volume and point source (e.g., drip)	0.7	0.9

WE 3. Indoor Water Use *in Mid-rise Buildings*

Maximum points: 8

Intent

Minimize indoor demand for water through water-efficient fixtures and fittings.

Requirements

Prerequisites

None.

Credits

Note: Compensating shower valves[1,2] and conventional, non-compensating shower valves[3] may not work properly when low -flow showerheads (restricting water flow below 2.5 gpm) are installed. Installing low-flow showerheads where compensating valves or conventional, non-compensating valves are installed can increase the risk of scalding (or other types of injuries, such as slips and falls due to thermal shock) when the plumbing system experiences pressure changes. Make sure any low-flow showerhead is installed with a valve that has been designed, tested and verified to function safely at the reduced flow rate. If in doubt, consult the manufacturer of the valve before installing a low-flow showerhead. Please see the LEED for Homes Reference Guide for more information.

3.1 **High-Efficiency Fixtures and Fittings** (1 point each, maximum 3 points). Meet one or more of the following requirements by installing high-efficiency (low-flow) fixtures or fittings. A project cannot earn points in both WE 3.1 and WE 3.2 for the same fixture type (e.g., faucet, shower, or toilet).

a) The average flow rate for all lavatory faucets must be ≤ 2.0 gpm.

b) The average flow rate for all showers must be ≤ 2.0 gpm per stall.

c) The average flow rate for all toilets must be ≤ 1.3 gpf ***OR***

toilets must be dual-flush and meet the requirements of ASME A112.19.14 ***OR***

toilets must meet the U.S. EPA WaterSense specification and be certified and labeled accordingly.

3.2 **Very High Efficiency Fixtures and Fittings** (2 points each, maximum 6 points). Meet one or more of the following requirements by installing very high efficiency fixtures or fittings. A project cannot earn points in both WE 3.1 and WE 3.2 for the same fixture type (e.g., faucet, shower, or toilet).

a) The average flow rate for all lavatory faucets must be ≤ 1.5 gpm ***OR***

lavatory faucets must meet the U.S. EPA WaterSense specification and be certified and labeled accordingly.

b) The average flow rate for all showers must be ≤ 1.75 gpm per stall.

c) The average flow rate for all toilets must be ≤ 1.1 gpf.

3.3 **Water-Efficient Appliances for MID-RISE** (1 point each, maximum 2 points). Install one or both of the following:

a) Water-Efficient Clothes Washer. Install clothes washers with modified energy factor (MEF) ≥ 2.0 and water factor (WF) < 5.5. Clothes washers must be installed in each unit, or provided in a shared facility to adequately meet the demand of the entire building.

b) ENERGY STAR labeled dishwasher(s) that use 6.0 gallons or less per cycle.

Synergies and Trade-Offs

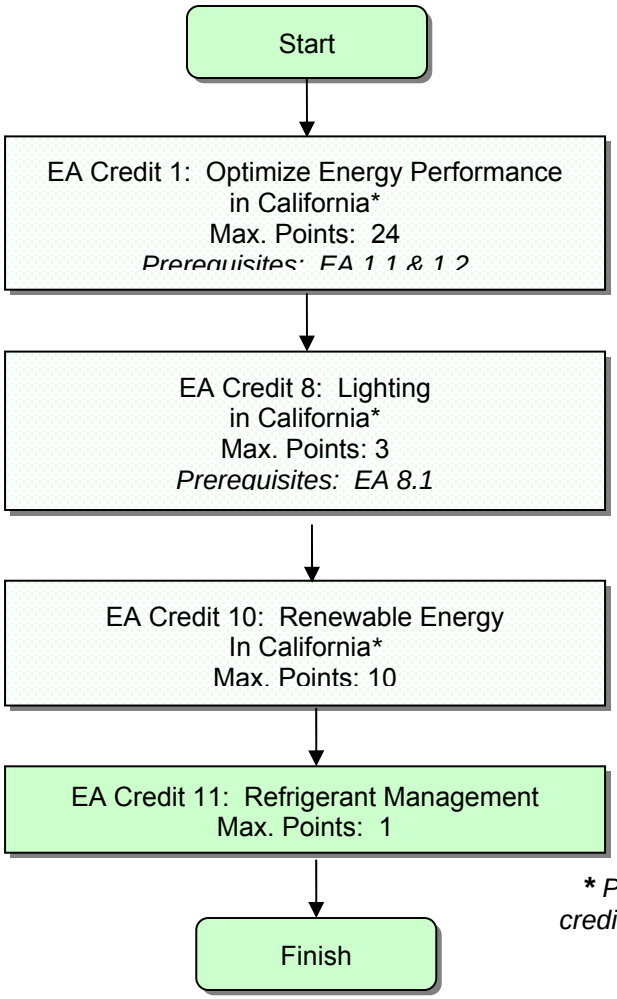
Indoor water savings also can be achieved with more efficient water distribution systems and appliances.

Low-flow showerheads and faucets will reduce demand for hot water and resulting energy use for water heating. Energy modeling in the EA category addresses water heating efficiency.

Energy and Atmosphere

Pathway Through EA Credits

in Mid-rise Multi-family Buildings in California



***** *Please see revised EA credits for Mid-rise Buildings in California*

EA 1. Optimize Energy Performance *in Mid-rise Buildings in California*

Maximum Points: 24

Intent

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements

Prerequisites

1.1 **Minimum Energy Performance for MID-RISE.** Design the building project to comply with the following:

- Conduct a whole building simulation of the proposed building and a baseline building, as per the requirements of Title-24 for high-rise buildings.
- Using the output of the whole building simulation model and the load modifications outlined in Appendix A, demonstrate a 14% reduction in energy use in the proposed building when compared to a baseline building meeting the requirements of Title-24.

1.2 **Reduced Envelope Leakage for MID-RISE**. As part of the verification of the mandatory provisions in Section 5.4 of ASHRAE Standard 90.1-2004 do all of the following:

- Include a list of elements to be sealed in construction documents. This list should include all elements identified in ASHRAE 90.1, Section 5.4.3.1, or applicable state codes, in addition to any site-specific elements identified during plan review. Bid documents must include locations to be sealed as well as acceptable methods and materials.
- Include Air Barrier sheet in the bid documents that shows the air barrier continuity through the various conditions of the exterior enclosure, and can serve as an index to relevant details.
- Include a “compartmentalization” sheet in the bid documents that shows the continuity of fire and smoke barriers around each apartment and between various areas (corridors, stairs, common areas), and can serve as an index to relevant details.

Credits

1.3 **Optimize Energy Performance** (maximum 24 Points). Using the output of the whole building simulation model and the load modifications outlined in Appendix A, demonstrate more than a 14% reduction in energy use in the proposed building when compared to a baseline building meeting the requirements of Title-24. The relationship between energy reduction and LEED for Homes points can be calculated using the equation below, the table in Exhibit EA1-B, or the chart in Exhibit EA1-A.

Equation:

LEED Pts in Mid-rise Multi-Family Buildings in California =

[Log (% energy cost savings) / 0.025] - 43

Exhibit EA1-A
LEED for Homes Points vs. Energy Reduction

(using CA Title-24 for high-rise buildings and the model adjustments in Appendix A)

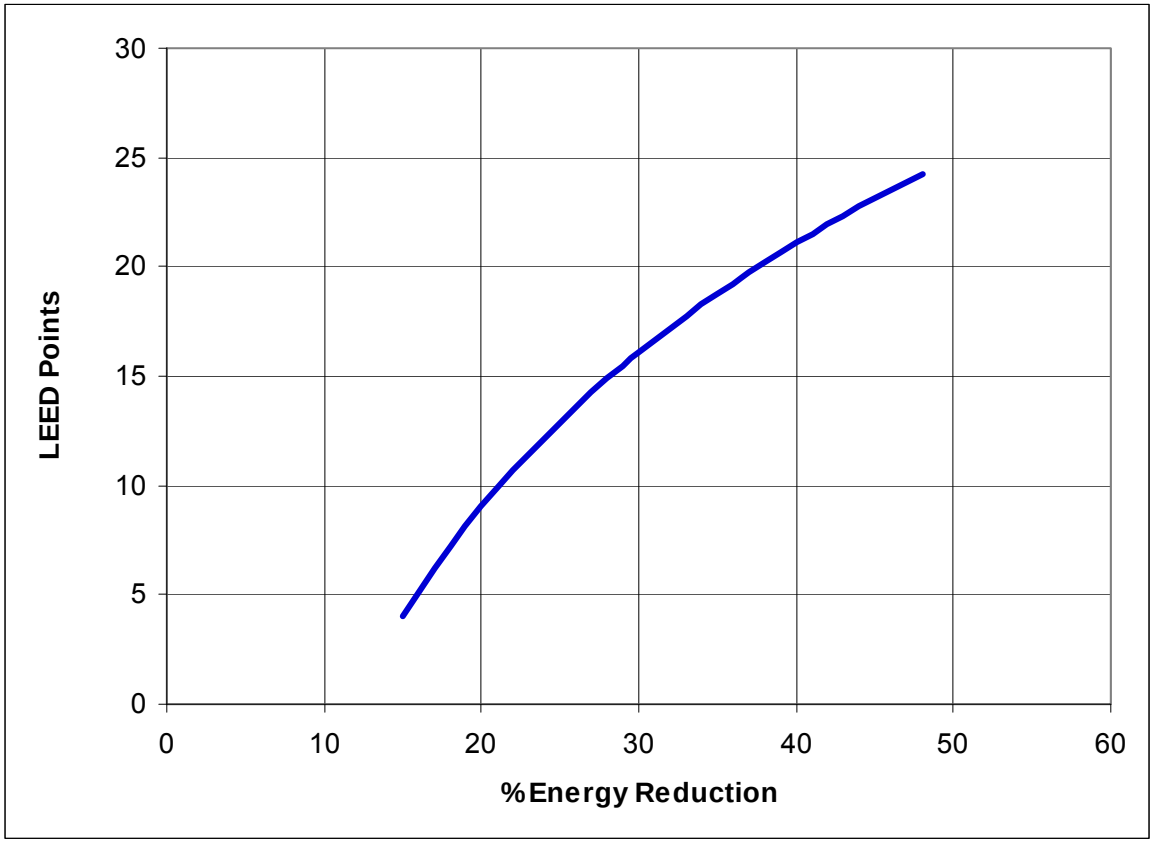


Exhibit EA1-B
LEED for Homes Points for Mid-rise Buildings
Based on Energy Reductions Compared to Title-24

Mid-rise Multi-family Buildings in California	
Energy Reduction	LEED for Homes Points
0	
5	
10	
11	
12	
13	
14	
15	4.0
16	5.0
17	6.0
18	7.0
19	8.0
20	9.0
21	10.0
22	10.5
23	11.5
24	12.0
25	13.0
26	13.5
27	14.5
28	15.0
29	15.5
30	16.0
31	16.5
32	17.0
33	17.5
34	18.5
35	19.0

Mid-rise Multi-family Buildings in California	
Energy Reduction	LEED for Homes Points
36	19.5
37	19.5
38	20.0
39	20.5
40	21.0
41	21.5
42	22.0
43	22.5
44	22.5
45	23.0
46	23.5
47	24.0
48	24.0
49	**Maximum 24 Points Available**
50	
55	
60	
65	
70	
75	
80	
85	
90	
95	
100	

Verification / Submittals

The Provider's third-party rater shall:

- Conduct any in-field performance tests to produce an accurate energy simulation model;
- Place a copy of the energy rating report in the project documentation file; and
- Check the appropriate box on signed LEED for Homes checklist.

Synergies and Trade-Offs

Mid-rise buildings must perform energy modeling and must skip EA 2 through 7 and 9.

EA 8. Lighting
in Mid-rise Buildings in California

Maximum Points: 3

Intent

Reduce energy consumption associated with interior and exterior lighting.

Requirements

Prerequisites

8.1 **Basic Lighting.** Meet the lighting requirements of Title-24 in California.

Credits

8.2 **Advanced In-Unit Lighting** (3 Points). In-unit apartment lighting must meet one of the following requirements:[4]

a) Installing high-efficacy lighting throughout the units, as described in Chapter 6 of the CEC 2005 Building Energy Efficiency Standards Compliance Manual);

b) Where controls (e.g. occupant sensors, dimmers) are used to comply with Title-24 requirements, at least 60% of all fixtures must be ENERGY STAR labeled.

c) Where controls (e.g. occupant sensors, dimmers) are used to comply with Title-24 requirements, at least 90% of all lamps must be ENERGY STAR labeled.[5]

Synergies and Trade-Offs

The lighting loads produced by the energy simulation model should not be included when calculating overall energy performance for EA prerequisite 1.1 and EA credit 1.3.

[4] California code (see 2005 Building Energy Efficiency Standards) requires that all in-unit lighting either be provided by high-efficacy light fixtures or controls (e.g. dimmers, sensors).

[5] A home may meet the requirements of part c) with ENERGY STAR labeled compact fluorescent lamps.

EA 10. Renewable Energy *in Mid-rise Buildings in California*

Maximum Points: 10

Intent

Reduce consumption of non-renewable energy sources by encouraging the installation and operation of renewable electric generation systems.

Requirements

Prerequisites

None

Credits

10 **Renewable Energy System. (Max 10 Points.)** Design and install a renewable electricity generation system. Use energy modeling to estimate both the electricity supplied by the renewable energy system and the annual reference energy load. Receive 1 Point for every 5 percent of annual energy reference load met by the system.

Annual reference energy load is defined as the amount of energy (kBtu/ ft^2) a comparable code-compliant building (e.g. Title-24 Standard Design building) would consume in a typical year.

a) Identify the energy loads (kBtu/ ft^2) for the Standard Design building using the Title-24 energy model output.

b) Identify the estimated electricity production (kWh) from the renewable energy system using a renewable energy output model. Convert the units from kWh to kBtu/ft^2 using the building square footage and a conversion factor of 3.413 kBtu per kWh.

c) Calculate the percent of the annual reference energy loads supplied by the renewable energy system and divide by 5 to determine the number of LEED points earned.

The following is a sample calculation for determining the number of LEED points:

Annual reference energy load in Title-24 Standard Design home	= 100 kBtu/ft^2
Annual electricity supplied by renewable energy system	= 4.4 KWh/ft^2
Converted to kBtu/ft^2	= 15.0 kBtu/ft^2
Percent of annual reference energy load supplied by renewable energy system	= 15 / 100 = 15 %
LEED points, under EA 10	*= 15 ÷ 5 = 3.0 Points*

Verification / Submittals

The Provider's third-party rater shall:

- ✓ Confirm that the Accountability Form (in Attachment C) has been signed by the engineer or responsible party, declaring that the renewable electric generation system has been designed and installed appropriately, and place in Project Documentation File; and

- ✓ Calculate the electric consumption in the Title-24 compliant Standard Design home, the estimated annual on-site renewable electricity generation, the % supplied by the renewable system, and the corresponding LEED points, as described above; and
- ✓ Check the appropriate box on signed LEED for Homes checklist.

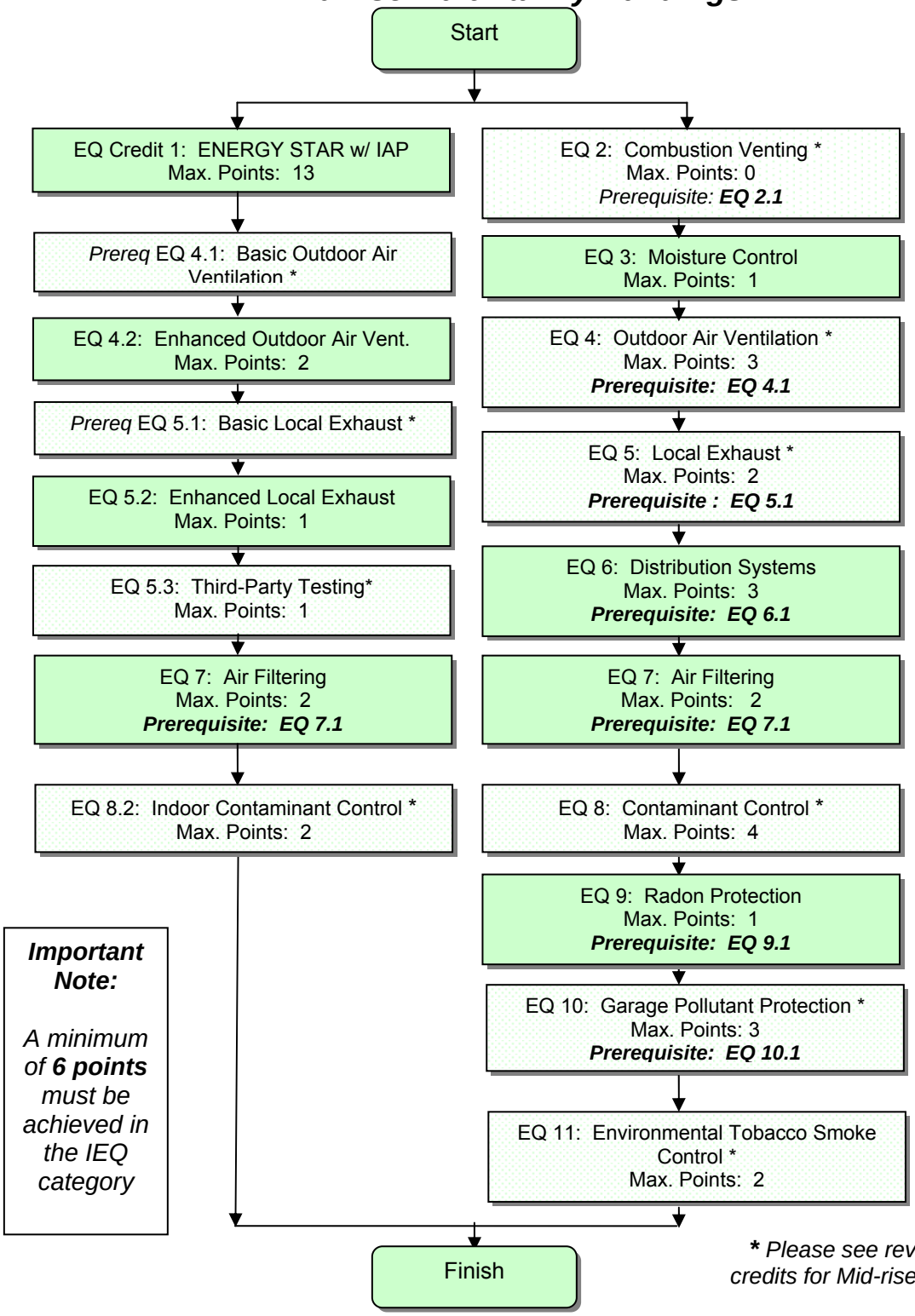
Synergies and Trade-Offs

Passive solar designs must be modeled, and can take credit using the approach laid out in EA credit 1.

Indoor Environmental Quality (EQ)

Optional Pathways through EQ Credits

in Mid-rise Multi-family Buildings



Important Note:

*A minimum of **6 points** must be achieved in the IEQ category*

***** *Please see revised EQ credits for Mid-rise Buildings*

EQ 2. Combustion Venting *in Mid-rise Buildings*

Maximum Points: 0

Intent

Minimize the leakage of combustion gases into the occupied space of the home.

Requirements

Prerequisites

2.1 **Basic Combustion Venting Measures.** Meet all of the following requirements:

a) No unvented combustion appliances (e.g. decorative logs) are allowed.

b) A carbon monoxide (CO) monitor must be installed on each floor (in each unit).

c) All fireplaces and woodstoves must have doors.

d) Space and water heating equipment that involves combustion must meet one of the following. Space heating systems in homes located in IECC-2007 climate zones 1 or 2 are exempt.

i. It must be designed and installed with closed combustion (i.e. sealed supply air and exhaust ducting);

ii. it must be designed and installed with power-vented exhaust; or

iii. it must be located in a detached utility building or open-air facility.

Credits

None.

EQ 4. Outdoor Air Ventilation *in Mid-rise Buildings*

Maximum Points: 3

Intent

Reduce occupant exposure to indoor pollutants by ventilating with outdoor air.

Requirements

Prerequisites

4.1 Basic Outdoor Air Ventilation for MID-RISE. Meet all of the following requirements:

a) Design and install a whole unit ventilation system that complies with both of the following requirements. Except as noted below, these requirements may only be met through the use of mechanical ventilation supplied directly to the unit (not common areas or hallways) or exhaust-only ventilation with a dedicated make-up air source (e.g. trickle ventilators).

i. ASHRAE 62.2-2007 requirements for outdoor air ventilation (see Equation 1 or Table 16-1 below). Operable windows *may not* be used towards meeting this minimum requirement.

ii. ASHRAE 62.1-2007 Equation 6-1 requirements for outdoor air ventilation (see Equation 2 or Table 16-2 below). Operable windows *may* be used to meet this minimum requirement.

b) Outdoor air intakes (including trickle ventilators) must be further from potential contaminant sources than the distances in ASHRAE 62.1-2007 Table 5-1, shown below in Table 17.

c) Where mechanical ventilation is used, outdoor air intakes must comply with Sections 5.6.2 thru 5.6.4 of ASHRAE 62.1-2007 to prevent rain and snow intrusion and entrainment.

d) Where exhaust-only ventilation with dedicated make-up air is used, the following requirements must be met:

i. The system must be approved and verified by a licensed HVAC engineer as providing ventilation to fulfill part (a) above.

ii. Install at least one outdoor make-up air source (e.g. trickle ventilator) per room. Bathrooms, kitchens, closets, pantries, and laundry rooms are exempt. Each make-up air source must meet all of the following:

- Non-adjustable or set to a minimum flow rate so that ventilation described by ASHRAE 62.2-2007 Equation 4.1a will be satisfied for the whole unit.
- Located behind heaters/air conditioners, above windows, or designed in some other way so that incoming air mixes and heats/cools to the temperature of room air before reaching the occupant.
- Designed with discharge velocity ≤ 500 ft/min, where discharge velocity = flow rate (CFM) ÷ available air opening (ft^2).

e) Each unit must be compartmentalized, to prevent excessive leakage between units. Meet both of the following:

1) Weather-strip each unit, seal vertical plumbing cracks, and seal off vertical shafts (including utility chases, garbage chutes, mail drops, and elevator shafts).

2) Conduct a blower door test, with maximum unit leakage of 7.0 ACH50. This leakage must include leakage to adjoining units (i.e. units should not be pressurized to eliminate inter-unit leakage during the blower door test).

Credits

4.2 Enhanced Outdoor Air Ventilation for MID-RISE (2 points). Install a system that provides heat transfer between the incoming outdoor air stream and the exhaust air stream, such as a heat-recovery ventilator (HRV) or energy-recovery ventilator (ERV). The heat recovery system must be listed by a certified testing lab (e.g., UL, ETL).

4.3 Third-Party Performance Testing for MID-RISE (1 point). Have a third-party test the flow rate of ventilation to each unit and verify that the ventilation requirements in EQ 4.1 are met.

Synergies and Trade-Offs

A project receiving points for EQ 1 is not eligible to earn points for EQ 4.3, but must meet EQ 4.1 and may earn points for EQ 4.2. A project pursuing EQ 4.3 must meet all the prerequisites in EQ 2-10.

From a health perspective, it is important not to under-ventilate a home. From an energy perspective, it is important not to over-ventilate.

Exhaust fans, which also provide the local exhaust required by EQ 5.1, can simultaneously facilitate the outdoor air ventilation system for the home, with sufficient make-up air provided mechanically or by trickle ventilators.

Equation 1: Minimum Ventilation Requirements for Dwelling Units (not including windows)[6]

$$V = 0.01*A + 7.5*P$$

Equation 2: Minimum Ventilation Requirements for Dwelling Units (including operable windows)[7]

$$V = 0.06*A + 5*P$$

Where:

V = volume of ventilation delivered, in cfm

A = total occupiable floor area, in square feet

P = number of people expected for the unit. Expect 2 persons for a studio or 1-bedroom apartment, with one additional person per additional bedroom.

[6] From ASHRAE Std. 62.2.

[7] From ASHRAE Std. 62.1, Table 6-1. Ventilation rates differ for common corridors, commercial spaces, etc.

Table 16-1. Sample Ventilation Requirements for EQ 4.1.a.i., in cfm. Operable windows cannot be counted towards these requirements. ASHRAE 62.2-2007 Equation 4.1a may instead be used to calculate the exact requirement for a specific project.

Conditioned Floor Area (ft^2)	Bedrooms				
	0, 1	2	3	4	5
≤ 500	20	27.5	35	42.5	50
501 – 1,000	25	32.5	40	47.5	55
1,001 – 1,500	30	37.5	45	52.5	60
1,501 – 2,000	35	42.5	50	57.5	65
2,001– 2,500	40	47.4	55	62.5	70
2,501 – 3,000	45	52.5	60	67.5	75

Credit : ASHRAE 62.1-2007. ©American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.

Table 16-2. Sample Ventilation Requirements for EQ 4.1.a.ii, in cfm. Operable windows can be used to meet the increased ventilation of these requirements compared with Table 16-1. ASHRAE 62.1-2007 Equation 6.1 may instead be used to calculate the exact requirement for a specific project.

Conditioned Floor Area (ft^2)	Bedrooms				
	0, 1	2	3	4	5
≤ 500	40	45	50	55	60
501 – 1,000	70	75	80	85	90
1,001 – 1,500	100	105	110	115	120
1,501 – 2,000	130	135	140	145	150
2,001– 2,500	160	165	170	175	180
2,501 – 3,000	190	195	200	205	210

Credit : ASHRAE 62.1-2007. ©American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.

Table 17. Minimum Distances from Potential Contamination Sources for Air Intakes, in feet.

Contamination Source	Minimum Distance
Significantly contaminated exhaust [1]	15
Noxious or dangerous exhaust [2, 3]	30
Vents, chimneys, and flues from combustion appliances and equipment [4]	15
Garage entry or automobile loading area [5]	15
Truck loading area or dock, bus parking/idling area [5]	25
Driveway, street, or parking place	5
Thoroughfare with high traffic volume	25
Roof, landscaped grade, or other surface directly below intake [6, 7]	1
Garbage storage/pick-up area, dumpsters	15

1. Significantly contaminated exhaust has a significant contamination concentration, significant sensory-irritation intensity, or offensive odor.
2. For laboratory fume hood exhaust, see ASHRAE 62.1-2007 Table 5-1.
3. Noxious or dangerous exhaust air is highly objectionable fumes or gases and/or exhaust air with potentially dangerous particles, bioaerosols, or gases at concentrations high enough to be considered harmful.
4. Shorter separation distances are permitted for some fuel gas and oil burning appliances and equipment. See ASHRAE 62.1-2007 Table 5-1 for details.
5. Distance measured to closest place that vehicle exhaust is likely to be located.
6. No minimum separation distance applies to surfaces that are sloped more than 45 degrees from horizontal or that are less than 1 in. wide.
7. Where snow accumulation is expected, distance listed shall be increased by the expected average snow depth.

Credit : ASHRAE 62.1-2007 Table 5.1. ©American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.

EQ 5. Local Exhaust *in Mid-rise Buildings* — Maximum points: 2

Intent

Reduce moisture and exposure in indoor pollutants in kitchens and bathrooms.

Requirements

Prerequisites (Mandatory Measures)

5.1 **Basic Local Exhaust**. Meet all of the following requirements:

a) Design and install local exhaust systems in all bathrooms (including half-baths) and the kitchen to meet the following requirements:

i) Provide sufficient exhaust to meet the requirements of Table 6-4 of ASHRAE Standard 62.1-2007. Sample requirements that relate to minimum local exhaust flow rates are presented in Table 19 below.

ii) Seal ductwork. Ductwork cannot be sealed with cloth tape, but should be sealed with mastic or metal-backed tape, aerosol sealant closures, or gasketing systems.

iii) Ducts carrying bathroom and kitchen exhaust must be negatively pressurized relative to the spaces through which they pass.

b) Exhaust air to the outdoors through the roof or outside wall.

c) Use ENERGY STAR labeled bathroom exhaust fans (except for exhaust fans serving multiple bathrooms).

Credits (Optional Measures)

5.2 **Enhanced Local Exhaust** (1 point). Use one of the following strategies in every bathroom to control the use of the local exhaust fan:

a) An occupancy sensor.

b) An automatic humidistat controller.

c) An automatic timer to operate the fan for a timed interval after occupant leaves the room.

d) A continuously operating exhaust fan.

5.3 **Third-Party Performance Testing** (1 point). Perform a third-party test of each exhaust air flow rate for compliance with the requirements of Table 6-4 in ASHRAE Standard 62.1-2007. Testing should ensure that ductwork carrying kitchen and bath exhaust is negatively pressurized.

Table 19: Minimum Air Flow Requirements for Local Exhaust

Location	Minimum Air Flow: Intermittent	Minimum Air Flow: Continuous
Kitchen	100 cfm	50 cfm
Bathroom	50 cfm	25 cfm

Synergies and Trade-Offs

A project receiving points for EQ 1 is eligible to earn points for EQ 5.2 and EQ 5.3.

If designed properly, exhaust fans can also provide sufficient outdoor air ventilation system for the entire home, as required by EQ 4.1.

EQ 8. Contaminant Control *in Mid-rise Buildings*

Maximum *Points: 4*

Intent

Reduce occupant's exposure to indoor airborne contaminants through source testing and removal.

Requirements

Prerequisites (Mandatory Measures)

None.

Credits (Optional Measures)

8.1 **Indoor Contaminant Control During Construction** (1 Point). Upon installation, seal all permanent ducts and vents to minimize contamination during construction. Remove any seals after all phases of construction are completed.

8.2 **Indoor Contaminant Control for MID-RISE** (1 Point each, Max. 2 Points). Select from the measures below:

- Design and install permanent walk-off mats for each unit that are at least 4 feet in length and allow accessibility for cleaning (e.g. grating with catch basin).

  OR

  Employ permanent entryway systems at least six feet long in the primary direction of travel to capture dirt and particles from entering the building at all entryways that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles, or slotted systems that allow for cleaning underneath. Roll-out mats are only acceptable when maintained on a weekly basis by a contracted service organization. Qualifying entryways are those that serve as regular entry points for building users, and that are directly connected to the outdoors.
- In each unit, design a space near entryway for removing and storing shoes that is separated from living areas. This space may not have wall-to-wall carpeting and it must be large enough to accommodate a bench and at least 2 pairs of shoes per bedroom.
- Install central vacuum system in each unit with exhaust to the outdoors. Ensure exhaust is not near ventilation air intake.

8.3 **Preoccupancy Flush** (1 Point). Flush each unit with fresh air, according to the following guidelines:

a) Flush prior to occupancy but after all phases of construction are completed.

b) Flush the entire unit, keeping all interior doors open.

c) Flush for 48 total hours; the hours may be nonconsecutive, if necessary.

d) 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.

e) Use additional fans to circulate air within the home.

f) Replace or clean HVAC air filter afterward, as necessary.

Synergies and Trade-Offs

Products with low VOC emissions greatly benefit indoor air quality. Thus, the LEED points for such products are included in MR Credit 2, Environmentally Preferable Products.

If using EQ Credit 1, then must skip this credit.

EQ 10. Garage Pollutant Protection *in Mid-rise Buildings*

Maximum *Points: 3*

Intent

Reduce occupant exposure to indoor pollutants originating from an adjacent garage.

Requirements

Prerequisites (Mandatory Measures)

10.1 **No HVAC in Garage**. Do not place air handling equipment or any ductwork in garage.

Credits (Optional Measures)

10.2 **Minimize Pollutants from Garage for MID-RISE** (2 Points). Tightly seal shared surfaces between garage and conditioned spaces, including:

a) Conditioned spaces above garage
   i) All penetrations sealed
   ii) All connecting floor/ceiling joist bays sealed
   iii) Paint walls/ceilings (CO can penetrate unfinished drywall through diffusion)

b) Conditioned spaces next to garage
   i) Weather stripped doors, with CO detector in interior room adjacent to inside of door;
   ii) All penetrations sealed; and
   iii) Seal all cracks at the base of walls.

c) Include a vestibule that provides an airlock between the garage and adjacent occupiable spaces OR provide self-closing doors and deck-to-deck partitions or a hard lid ceiling.

AND/OR

10.3 **Exhaust Fan in Garage** (1 Point). Exhaust the garage sufficiently to create negative pressure with respect to adjacent spaces with the doors to the room closed. The exhaust rate shall be at least 0.50 cfm/ ft^2, with no air recirculation, provided continuously.

OR

10.4 ***Detached Garage or No Garage*** (3 Points).

Synergies and Trade-Offs

If using EQ Credit 1, then must skip this credit.

EQ 11: Environmental Tobacco Smoke (ETS) Control *in Mid-rise Buildings*

Maximum Points: 2

Intent

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

Requirements

Prerequisites

None.

Credits

11.1 **Environmental Tobacco Smoke Reduction for MID-RISE** (Maximum 2 Points).

a) Reduce smoke exposure and transfer (1 point). Implement rules and restrictions to achieve the following (1 point):

i. Prohibit smoking in all common areas of the building. The prohibition must be communicated in building rental/lease agreements or condo/coop association covenants and restrictions, and provisions for enforcement must be included.

ii. Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes, and operable windows opening to common areas.

iii. Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units.

iv. All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.

b) Significantly reduce smoke exposure and transfer (2 points). Meet the requirements of part (a) above and perform a blower door test to ensure that smoke transfer between units is minimized. Total unit leakage, including envelope and inter-unit leakage, must be ≤ 4.0 ACH 50 or ≤ 1.25 in^2 per 100 ft^2 of enclosure area.

OR

11.2 **Environmental Tobacco Smoke Prohibition for MID-RISE** (Maximum 2 Points). Implement rules and restrictions to achieve the following:

b) Prohibit smoking in the building. The prohibition must be communicated in building rental/lease agreements or condo/coop association covenants and restrictions, and provisions for enforcement must be included.

b) Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes, and operable windows.

Appendix A.
Log of changes to the Mid-rise Pilot Program Guidelines for California

Appendix A. Log of changes to the Mid-rise Pilot Guidance for California

Date	Section	Changes
7/22/08	Various	Included changes to the ID, LL, SS, WE, MR and EQ sections for mid-rise buildings.
7/22/08	EA 1	Increased the minimum requirement from 10% above Title-24 to 14% above Title-24. The formula converting % energy reduction to LEED points has also changed.
7/22/08	EA 10	Changed the instructions in EA 10 for estimating the impact of renewable energy systems.
8/20/08	EA 1.2	Changed the requirements in EA 1.2 to be appropriate for California, where Title-24 is used instead of ASHRAE Std. 90.1.
8/20/08	EQ 11.1	In part (b), changed the blower door test requirement to include an alternative option of ≤ 1.25 in^2 per 100 ft^2 of enclosure area.

Appendix B.
Model Adjustments for Energy Performance Calculations
For mid-rise buildings in California participating in LEED for Homes

Adjustments to the Title-24 simulation model output for use with EA prerequisite 1.1 and EA credit 1.3

Section B1. Introduction

Title-24 provides thorough guidance for how to conduct a whole-building energy simulation model. A code-compliant energy model can be constructed using various programs, but every program produces two sets of data: the annual energy loads ($kBtu/ft^2$) for the Standard Design and the annual energy loads for the Proposed Design. Each set of annual energy loads includes a breakdown for nine demand components, which include: space heating; space cooling; indoor fans; heat rejection; pumps & miscellaneous; domestic hot water; lighting; receptacle; and process.

In an effort to promote deeper energy reductions, LEED for Homes awards points in EA credit 1.3 for exceeding the performance requirements of Title-24. Since the Title-24 modeling regime was designed primarily to help builders demonstrate code compliance, not to create a benchmark for improved performance, LEED for Homes requires some adjustments to the model output.

This section explains how the Title-24 energy simulation model output should be adjusted for use in meeting EA prerequisite 1.1 and earning points in EA credit 1.3. The adjustments to the model output consist of 5 basic steps:

Step 1. Conduct a whole-building energy simulation using any Title-24 code-compliant software. This model will produce annual energy loads for the Standard Design and Proposed Design.

Step 2. In a separate calculation (outside the model), subtract the lighting loads from both the Standard Design and Proposed Design. Lighting is addressed in EA credit 8.

Step 3. In a separate calculation, replace the domestic hot water load estimate for the Proposed Design with a modified domestic hot water load estimate using the method laid out in Section B2 below. The Standard Design domestic hot water load should not be modified.

Step 4. In a separate calculation, replace the receptacle load estimate for both the Standard Design and Proposed Design with modified receptacle load estimates using the method laid out in Section B3 below.

Step 5. Add the modified receptacle load to the remaining energy loads for the Standard Design. Add the modified receptacle load and domestic hot water load to the remaining energy loads for the Proposed Design. Compare the modified totals for the Proposed Design to the modified totals for the Standard Design to calculate the overall energy reduction estimate needed for EA prerequisite 1.1 and EA credit 1.3.

Section B2. Modified Domestic Hot Water Loads

The modeling regime for Title-24 does not provide any incentive for reducing hot water loads. LEED for Homes wants to encourage reduced hot water demand, so this section outlines a method for modifying the domestic hot water loads. This method allows buildings to take credit for four strategies:

- Low-flow shower heads
- Low-flow fixtures
- Water-efficient dishwashers
- Water-efficient clothes washers

The method outlined in this section produces a modified DHW load for the Proposed Design, which impacts the energy performance as calculated for EA prerequisite 1.1 and EA credit 1.3. Buildings that install low-flow fixtures can also earn points in the Water Efficiency section of the LEED for Homes Rating System.

Use equations (1) through (3) to calculate the modified domestic hot water load for the Proposed Design.

(1) DHWp = DHWm*(0.4) + DHWm*Fix*(0.45) + DHWm*App*(0.15)

(2) Fix = 0.36 + 0.54*(LFS/2.5) + 0.1*(LFF/2.2)

(3) App = (CWp + DWp) / (CWb + DWb)

Where:

DHWm is the DHW load for the Proposed Design estimated by the Title-24 model
DHWp is the modified DHW load for the Proposed Design
Fix is a multiplier to the hot water loads associated with fixtures
App is a multiplier to the hot water loads associated with appliances
LFS is the average flow (Gallons per minute) of the showerheads in the Proposed Design
LFF is the average flow (Gallons per minute) of the bathroom faucets in the Proposed Design
CWp is the hot water usage (Gal/yr) for the clotheswasher in the Proposed Design (see below)
DWp is the hot water usage (Gal/yr) for the dishwasher in the Proposed Design (see below)
CWb is the hot water usage (Gal/yr) for the clotheswasher in the Standard Design (see below)
DWb is the hot water usage (Gal/yr) for the dishwasher in the Standard Design (see below)

Solving Clothes washer usage (CWp and CWb)

1) If the proposed design clotheswasher is ENERGY STAR labeled, then go to www.energystar.gov/index.cfm?fuseaction=clotheswash.display_products_html and identify the water consumption and size (cubic feet) of the proposed model. Set CWp equal to 20% of the water consumption in the table. Set CWb = 0.2 * Vcf * 11 * 392, where Vcf is equal to the proposed clotheswasher volume.
2) If the proposed design clotheswasher is not known, but it is ENERGY STAR labeled, assume CWp is equal to 1375 gallons, and CWb is equal to 1700 gallons.
3) If the proposed design clotheswasher is not ENERGY STAR labeled, set CWp and CWb to 1700 gallons.

Solving Dishwasher usage (DWp and DWb)

1) If the proposed design dishwasher is known, identify the proposed water consumption for the appliance (Gal/cycle). Set DWp equal to 215 times the water use (Gal/cycle) for the proposed dishwasher. Set DWb equal to 1,935 gallons.
2) If the proposed design dishwasher is not known, but it is ENERGY STAR labeled, assume DWp is equal to 1,100 gallons, and DWb is equal to 1,935 gallons.
3) If the proposed design dishwasher is not known, assume set DWp and DWb equal to 1,935 gallons per year.

Section B3. Modified Receptacle Loads

The modeling regime for Title-24 does not provide any incentive for reducing appliance loads. LEED for Homes wants to encourage the use of high-efficiency appliances, so this section outlines a method for modifying the receptacle loads. This method allows buildings to take credit for three strategies:

- Energy-efficient refrigerators
- Energy-efficient dishwashers
- Energy-efficient clothes washers

The method outlined in this section produces modified receptacle loads for both the Proposed Design and Standard Design. These modified loads will affect the energy performance as calculated for EA prerequisite 1.1 and EA credit 1.3.

Step 1. Calculate the annual consumption (kWh) for all receptacle loads (including refrigerator, dishwasher, clothes washer, clothes dryer, cooking, and plug loads) using the methods described below.

Step 2. Convert the annual consumption for the receptacle loads from kWh to kBTU. Assume 3.413 kBTU per kWh.

Step 3. Calculate the energy density (kBTU/sf) by dividing the results from Step 2 by the total conditioned floor area of the building. This energy density is the modified receptacle load.

Follow these steps for both the Proposed Design and the Standard Design. Assume one refrigerator, one dishwasher, one clothes washer, one clothes dryer, and one cooking range/stove per unit, ***even if the building is not planning to include these appliances***.

Refrigerator loads

1) If the model of ENERGY STAR refrigerator is known, go to http://www.energystar.gov/index.cfm?fuseaction=refrig.display_products_html and find the refrigerator being used. Use "kwh/yr" for the Proposed Design, and "Federal standard kwh/year" for the Standard Design. Multiply each number by the total number of units to get totals for the whole building.
2) If the model of refrigerator is not known, but ENERGY STAR models are being used throughout the building, use the table below to estimate consumption in the Standard and Proposed Design. If the type is unknown, assume "side-by-side".
3) If ENERGY STAR models are not being used, assume 500 kWh/yr per unit for both the Standard and Proposed Design.

Type of Refrigerator	Standard Design (kWh/yr/unit)	Proposed Design (kWh/yr/unit)
Top freezer	500	425
Bottom freezer	575	500
Side-by-side	600	525

Dishwasher loads

1) Assume 400 kWh/year per unit for the Standard Design.
2) If ENERGY STAR models are being used, assume 300 kWh/year per unit for the Proposed Design.
3) If ENERGY STAR models *are not* being used, assume 400 kWh/year per unit for the Proposed Design.

Clothes washer loads

1) Assume 310 kWh/year per unit for the Standard Design.
2) If ENERGY STAR models are being used, assume 200 kWh/year per unit for the Proposed Design.
3) If ENERGY STAR models *are not* being used, assume 310 kWh/year per unit for the Proposed Design.

Clothes dryer loads

1) Assume the Proposed Design and Standard Design consumption (kWh/year) per unit is equal to 418 + 319*N, where N= average number of bedrooms in each unit.

Cooking loads

1) If electric stove/range is used, assume 600 kWh/year per unit for both the Proposed Design and Standard Design.

Plug loads

1) Assume 1.37 kWh per square foot of finished floor area per year for both the Proposed Design and Standard Design