

LEED® CANADA  
FOR HOMES 2009

**RATING SYSTEM**

LEED® Canada





# ADDENDUM

## LEED Canada for Homes 2009

### Energy & Atmosphere Credit 1 - Optimize Energy Performance

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**Projects registered after August 1<sup>st</sup>, 2012 must obtain a minimum of 8 points in Energy & Atmosphere Credit 1 (EAc1) in order to qualify for certification.** Eight (8) points in EA c1 is equal to achieving an EnerGuide 80 score or a Home Energy Rating System score of 72. If modeling in EnerGuide or HERS is not pursued, a minimum of 8 points on the prescriptive path must be achieved from EAc2, EAc3, EAc4, EAc5, EAc6 and EAc7.3.

If you have questions about this please follow up with your Provider or contact the CaGBC at [homes@cagbc.org](mailto:homes@cagbc.org) or by calling customer service at 1-866-941-1184 (press 5)



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## OVERVIEW OF LEED® CANADA FOR HOMES

*LEED® Canada for Homes* is an initiative designed to promote the transformation of the mainstream homebuilding industry toward more sustainable practices. *LEED® Canada for Homes* is targeting the top 25% of new homes with best practice environmental features. *LEED® Canada for Homes* is a collaborative initiative that actively works with all sectors of the homebuilding industry.

By recognizing sustainable design and construction in homes nationwide, *LEED® Canada for Homes* helps homebuilders differentiate their homes as some of the best homes in their markets, using a recognized national brand. Furthermore, homebuyers can more readily identify third-party-verified green homes.

While there are already a number of local or regional green homebuilding programs, *LEED® Canada for Homes* is attempting to provide national consistency in defining the features of a green home and to enable builders anywhere in the country to obtain a green rating on their homes. *LEED® Canada for Homes* represents a consensus standard for green homebuilding developed and refined by a diverse cadre of national experts and experienced green builders. The *LEED® Canada for Homes* Rating System is part of the comprehensive suite of LEED® assessment tools offered by the CaGBC to promote sustainable design, construction, and operations practices in buildings nationwide.

The *LEED® Canada for Homes* Rating System measures the overall performance of a home in eight categories:

1. **Innovation & Design Process (ID).** Special design methods, unique regional credits, measures not currently addressed in the Rating System, and exemplary performance levels.
2. **Location & Linkages (LL).** The placement of homes in socially and environmentally responsible ways in relation to the larger community.
3. **Sustainable Sites (SS).** The use of the entire property so as to minimize the project's impact on the site.
4. **Water Efficiency (WE).** Water-efficient practices, both indoor and outdoor.
5. **Energy & Atmosphere (EA).** Energy efficiency, particularly in the building envelope and heating and cooling design.
6. **Materials & Resources (MR).** Efficient utilization of materials, selection of environmentally preferable materials, and minimization of waste during construction.
7. **Indoor Environmental Quality (EQ).** Improvement of indoor air quality by reducing the creation of and exposure to pollutants.
8. **Awareness & Education (AE).** The education of the homeowner, tenant, and/or building manager about the operation and maintenance of the green features of a LEED® home.

The *LEED® Canada for Homes* Rating System works by requiring a minimum level of performance through prerequisites, and rewarding improved performance in each of the above categories. The level of performance is indicated by four performance tiers – Certified, Silver, Gold and Platinum – according to the number of points earned (Exhibit 1).

## EXHIBIT 1: LEED® CANADA FOR HOMES CERTIFICATION LEVELS

LEED® CANADA FOR HOMES CERTIFICATION LEVELS	NUMBER OF LEED® CANADA FOR HOMES POINTS REQUIRED
Certified	45—59
Silver	60—74
Gold	75—89
Platinum	90—136
Total available points	136

The number of points for each certification level is adjusted for smaller-than-average and larger-than-average homes using a mechanism called the Home Size Adjustment.

The Rating System guarantees minimum levels of sustainable practice through 18 prerequisites in the eight credit categories. At the same time, projects enjoy flexibility through the wide variety of credits available to achieve certification. Credit Interpretation Requests (CIRs) are also available to projects that seek clarification or special consideration on specific credits.

## HOW TO PARTICIPATE IN LEED® CANADA FOR HOMES

The strength of the *LEED® Canada for Homes* program is its third-party verification through *LEED® Canada for Homes* Providers and Green Raters.

*LEED® Canada for Homes* Providers are local and regional organizations chosen by the CaGBC to provide certification services to *LEED® Canada for Homes* projects in their local or regional markets. A Provider is selected based on its demonstrated abilities to manage a team of Green Raters. A Provider is under contract to the CaGBC to perform the following specific services:

- recruitment and registration of projects for *LEED® Canada for Homes*
- coordination and oversight of Green Raters
- submittal documents for pending *LEED® Canada for Homes* registered projects
- quality assurance for the certifications

A Green Rater is an individual who works as part of the *LEED® Canada for Homes* Provider team (and may be in-house staff or a subcontractor) to perform field inspections and performance testing. Green Raters may work closely with the individual project teams to assist the design and construction professionals in meeting their sustainability goals.

Green designers and consultants are also critical members of a project team. One of the primary lessons learned in the Canadian case study is that the success of a green homebuilding project is tied to how effectively the green measures are integrated into the home's design and how well the subcontractors understand how to properly install these green measures.

Although the Providers offer verification and certification services for *LEED® Canada for Homes* projects, many builders may need further support to effectively integrate additional green measures into their home designs, and to ensure that these designs are appropriately constructed by each subcontractor. In recognition of the vital role of these other stakeholders, the CaGBC is developing an advanced training course for green home designers and consultants.

The CaGBC intends to establish Green Raters in all markets as quickly as possible. Homebuilders outside the current service areas may contact the nearest *LEED® Canada for Homes* Provider to discuss participation. An updated list of Providers is maintained on the CaGBC website at [www.cagbc.org/leed/homes](http://www.cagbc.org/leed/homes).

## FIVE STEPS TO PARTICIPATE

### THERE ARE FIVE BASIC STEPS FOR PARTICIPATING IN LEED® CANADA FOR HOMES:

1. Contact a *LEED® Canada for Homes* Provider and register with the program.
2. Identify a project team.
3. Build the home to the stated goals.
4. Certify the project as a LEED® home.
5. Market and sell the LEED® home.

#### **Step 1: Contact a LEED® Canada for Homes Provider and register with the program**

Every participating builder or project manager starts by selecting a *LEED® Canada for Homes* Provider and registering for participation in *LEED® Canada for Homes*. A Provider can offer orientation and up-front technical assistance to builders, although some builders – particularly those with experience in green homebuilding – may not need these services.

Once the builder (or project manager) and the Provider have agreed to work in partnership on the project, the project is registered with the CaGBC.

#### **Step 2: Identify a project team**

After registering, the project team that will plan, design and build the home should be identified. The team should include professionals with both knowledge and experience in the eight *LEED® Canada for Homes* credit categories. These professionals work together to develop the project goals, identify potential challenges, and determine how best to contribute to the success of the project.

The project team starts by articulating the sustainability goals of the project and determining the specific strategies and systems integration required to meet them.

The *LEED® Canada for Homes* Provider or Green Rater will assist the project team with a preliminary rating of the home. This preliminary rating, a detailed review of the home's current design, determines its current scores in the *LEED® Canada for Homes* Rating System. As part of this design review, the following steps should be completed:

- performance testing of a typical example of builder's home design
- completion of preliminary project checklist (including suggested additional measures that may be needed to achieve a LEED® rating)
- a preliminary estimate of the *LEED® Canada for Homes* score and certification level.

Depending on the preliminary score, the project team may identify additional green measures to be pursued.

To appropriately introduce green measures into the home design, an integrated design approach should be followed. Each change may introduce both expected and unexpected challenges. With an integrated design process, all project team members are given an opportunity to evaluate potential challenges and offer solutions. Design charrettes are often used on large projects to bring together stakeholders with strong interests in the potential impacts of a given project. Also, it may be beneficial to bring in consultants who specialize in aspects of green homebuilding that are critical to the specific project.

### **Step 3: Build the home**

*LEED® Canada for Homes* is intended to provide project teams with guidance on both green design and green construction practices. Green homebuilding often requires that the trades learn new ways of doing things. Subcontractors new to green construction may need to be trained in the different installation practices for certain measures. The builder is encouraged to work with consultants who specialize in training trades.

The Green Rater is expected to conduct on-site performance tests and visual inspections of various measures in the home. These tests and inspections are essential to maintaining the rigor and integrity of the program. Typically, two on-site inspections are required for each project; one is conducted during construction of the home, usually just prior to drywall installation, and the other is conducted upon completion of the home.

The Provider and Green Rater work with the construction team and trades to schedule and complete the inspections. During the construction process, the builder can contact the Green Rater if questions, problems, or changes arise. The Green Rater may need to rescore the project if major changes are made during construction.

### **Step 4: Certify the home**

The certification process for the completed new home involves two components. First is the field inspection and performance testing. The Green Rater conducts a final inspection of the green measures on the project's *LEED® Canada for Homes* checklist and conducts the required performance tests (Exhibit 2). After conducting these inspections and performance tests, the Green Rater completes the project documentation package, which includes the following:

- completed and signed *LEED® Canada for Homes* checklist;
- completed and signed Accountability Forms; and
- completed and signed Durability Risk Evaluation Form and durability inspection checklist.

The Green Rater submits this package to the *LEED® Canada for Homes* Provider for review and approval.

## EXHIBIT 2: PERFORMANCE TESTS

PERFORMANCE TESTS		RESPONSIBLE PARTY	TYPE OF MEASURE	
CATEGORY			PREREQUISITE	CREDIT
EA	Envelope Leakage	Rater	X	
	Duct Leakage	Rater	X	
	HVAC Refrigerant Charge	HVAC	X	
EQ	Outdoor Air Flow	Rater		X
	Local Exhaust	Rater		X
	Supply Air Flow	Rater		X

The second component is certification by the *LEED® Canada for Homes* Provider. The Provider reviews the project documentation package submitted by the Green Rater. If it is satisfactory and the home is certified, the Provider notifies the project team and the CaGBC. The CaGBC then sends out the official notification and *LEED® Canada for Homes* certificate.

#### Step 5: Market and sell the LEED® home

Builders registered with *LEED® Canada for Homes* may market their LEED® certified homes with CaGBC-approved press releases, signage, and collateral pieces that highlight the LEED® brand. Please contact your Provider for more information.

Some projects may be driven by the homebuyer, in which case this step is not relevant.

## OVERVIEW OF THE RATING SYSTEM

### BASIC STRUCTURE OF THE RATING SYSTEM

The *LEED® Canada for Homes* Rating System has 35 topic areas, each with a unique intent or goal. Under the requirements section of each topic area, specific measures are identified that may be included in the home. Typically, these measures are structured as follows:

- 1.1 Good Practice: usually a prerequisite (i.e., mandatory measure)
- 1.2 Better Practice: usually worth 1 point
- 1.3 Best Practice: usually worth 2 points

### PREREQUISITES: MANDATORY MEASURES

Prerequisites are mandatory measures and must be completed during the design of construction phase. There are 19 prerequisite measures in *LEED® Canada for Homes*:

#### **Innovation & Design Process (ID)**

- 1.1 Preliminary Rating
- 2.1 Durability Planning
- 2.2 Durability Management

#### **Sustainable Sites (SS)**

- 1.1 Erosion Controls During Construction
- 2.1 No Invasive Plants

#### **Water Efficiency (WE)**

- 3.1 Fixture Efficiencies

#### **Energy & Atmosphere (EA)**

- 1.1 Performance achieving ERS 76 or HERS 80
- 11.1 Refrigerant Charge Test

#### **Materials & Resources (MR)**

- 1.1 Framing Order Waste Factor Limit
- 2.1 FSC-Certified Tropical Woods
- 3.1 Construction Waste Management Planning

**Indoor Environmental Quality (EQ)**

- 2.1 Basic Combustion Venting Measures
- 4.1 Basic Outdoor Air Ventilation
- 5.1 Basic Local Exhaust
- 6.1 Room by Room Load Calculations
- 7.1 Good Filters
- 9.1 Radon-Resistant Construction: Passive Ventilation
- 10.1 No HVAC in Garage

**Awareness & Education (AE)**

- 1.1 Basic Operations Training

## CREDITS: OPTIONAL MEASURES

The 67 credits in the Rating System are optional measures. However, a minimum number of points must be earned in some of the credit categories. The credit categories with minimum point requirements are listed in Exhibit 3 and highlighted in the grey bars in the *LEED® Canada for Homes* checklist.

EXHIBIT 3: PREREQUISITES AND MINIMUM POINT REQUIREMENTS

CREDIT CATEGORY	PREREQUISITES (MANDATORY MEASURES)	MINIMUM POINT REQUIREMENTS	MAXIMUM POINTS AVAILABLE
Innovation & Design Process (ID)	3	0	11
Location & Linkages (LL)	0	0	10
Sustainable Sites (SS)	2	5	22
Water Efficiency (WE)	1	3	15
Energy & Atmosphere (EA)	2	0	38
Materials & Resources (MR)	3	2	16
Indoor Environmental Quality (EQ)	7	6	21
Awareness & Education (AE)	1	0	3
Total	19	16	136

## SPECIAL FEATURES OF THE RATING SYSTEM

The *LEED® Canada for Homes* Rating System is a set of industry best practices that will help to guide a builder in constructing better homes. The actual performance of the finished home relates directly to the process that the builder and project team use to design and construct the *LEED®* home. The Rating System identifies specific measures that may be incorporated into the design of a home.

A high-performance home has the following attributes:

- design strategies that result in improved resource efficiency
- selection of environmentally responsible and high-performance materials, equipment, and systems
- construction practices that ensure that each of the measures above is installed properly

A builder should pay close attention to all three attributes to ensure a high-quality outcome. One of the early lessons learned in the Canadian Case Study is that it is critical to incorporate LEED® measures into the home's design at the earliest phase of design. Failure to do so may result in many unexpected challenges, including delays and mistakes.

With the basic intent to promote good design, the *LEED® Canada for Homes* Rating System includes the following design-related features:

### **Innovation & Design Process category at the front of the Rating System.**

The Innovation and Design Process category was brought to the front of the *LEED® Canada for Homes* Rating System to highlight the importance of design in a LEED® home. Two measures, Integrated Design Process and Durability Planning, are vital parts of the design process.


### **Integrated Design Process credit.**

The Integrated Design Process (ID Credit 1) topic area requires the builder to participate in a builder orientation and encourages the builder to include the entire design and construction team in regular project meetings. Establishing measurable goals up front and effectively integrating green measures into a home's design will help ensure that the project goals are met.

### **Durability Planning prerequisite.**

The Durability Planning (ID Credit 2.1) prerequisite requires that the project team address durability explicitly in the home design by assessing durability risk factors and identifying and incorporating specific measures into the home's design to address each factor.

### **Other design-related credits.**

As explained above, many measures in the Rating System have a substantial design component. These measures are difficult for the Green Rater to visually verify in the field. Credits that have a significant design component are designated with the “” symbol in the checklist. The professional responsible for each such measure must sign an Accountability Form (see below) to confirm that the measure has been completed according to the requirements of the Rating System.

## CREDIT INTERPRETATIONS AND INNOVATIVE DESIGN REQUESTS

The measures in the *LEED® Canada for Homes* Rating System are worth a total of 136 possible points. Aside from the requirements stated for each credit, there are two alternative methods of acquiring points:

**Credit Interpretation Requests (CIRs).** If a project team identifies an alternative way of achieving the intent of an existing LEED® credit, the team can request permission to meet the intent of the credit using an approach that is different from the stated requirements.

**Innovative Design Requests (IDRs).** An innovative design credit is a way of earning extra LEED® points outside the established credit categories. These credits are counted in ID Credit 3.1—3.4. There are three ways to earn ID points:

1. Implement technologies or strategies that are not included in the Rating System but that offer substantial environmental benefits.
2. Implement a regionally appropriate green technology or strategy that is not already addressed in the Rating System, for use within a defined region.
3. Demonstrate “exemplary performance” by substantially exceeding the requirements in a *LEED® Canada for Homes* credit. Exemplary performance guidelines for various credits are included in the *LEED® Canada for Homes* Reference Guide.

For both kinds of requests (CIRs and IDRs), the project team must submit a formal request to the CaGBC through the Provider. No points are awarded until the CaGBC has reviewed and approved the request. Both kinds of requests are handled according to the following process:

1. Formal request. The Provider submits a project team’s request to the CaGBC. The request or proposal should be structured like a LEED® credit; that is, it should include a title, intent, rationale, requirements, and documentation or verification requirements. Preliminary response. After reviewing the Credit Interpretation or Innovative Design Request, the CaGBC responds to the Provider by indicating that the proposed approach is (a) appropriate and eligible to earn points, (b) ineligible to earn points, or (c) appropriate and likely to earn the desired points with some indicated modifications, such as additional documentation or a higher performance threshold. In case (c), the CaGBC ruling is preliminary, subject to the receipt of the indicated modifications from the Provider.
2. Final rating. At the time of the final rating, the Provider can include the credit interpretation or innovative design credit in the final scoring for that LEED® home.

Both CIRs and IDRs should be submitted during the preliminary rating, and may be submitted only by the Provider on behalf of the project team.

## ACCOUNTABILITY FORMS

Many of the measures in the *LEED® Canada for Homes* Rating System have a substantial design component. These measures are difficult for the Green Rater to visually verify in the field.

An Accountability Form is intended to shift the responsibility for the verification from the Green Rater to the design professional responsible for a specific *LEED® Canada for Homes* measure. The form is to be signed by the responsible party (e.g., the builder, engineer, architect, landscape professional) who completed the design. With this form, he or she formally attests to the completion of the measure and compliance with the requirements.

Credits that require an Accountability Form signature are marked on the *LEED® Canada for Homes* checklist with the “” symbol.



### LEED Canada for Homes Simplified Project Checklist

<b>Builder Name:</b>
<b>Project Team Leader (if different):</b>
<b>Home Address (Street/City/Province):</b>

**Project Description:**

Building type:  
# of bedrooms: 0

Project type:  
Floor area (sq ft): 0

**Adjusted Certification Thresholds**

Certified: 45.0 Gold: 75.0  
Silver: 60.0 Platinum: 90.0

<b>Project Point Total</b>		<b>Final Credit Category Total Points</b>			
Prelim: 0 + 0 maybe pts	Final: 0	ID: 0	SS 0	EA: 0	EQ: 0
<b>Certification Level</b>		LL: 0	WI: 0	MR: 0	AE: 0
Prelim: Not Certified	Final: Not Certified	Min. Point Thresholds Not Met for Prelim. OR Final Rating			

date last updated :  
last updated by :

				Max Points	Project Points				
					Preliminary	Maybe	Final		
<b>Innovation and Design Process (ID)</b> (No Minimum Points Required)				OR	Max	Y/Pts	Maybe	No	Y/Pts
<b>1. Integrated Project Planning</b>	1.1	Preliminary Rating		Prereq					
	1.2	Integrated Project Team		1	0	0	0	0	0
	1.3	Professional Credentialed with Respect to LEED Canada for Homes		1	0	0	0	0	0
	1.4	Design Charrette		1	0	0	0	0	0
	1.5	Building Orientation for Solar Design		1	0	0	0	0	0
<b>2. Durability Management Process</b>	2.1	Durability Planning		Prereq					
	2.2	Durability Management		Prereq					
	2.3	Third-Party Durability Management Verification		3	0	0	0	0	0
<b>3. Innovative or Regional Design</b>	3.1	Innovation #1	_____	1	0	0	0	0	0
	3.2	Innovation #2	_____	1	0	0	0	0	0
	3.3	Innovation #3	_____	1	0	0	0	0	0
	3.4	Innovation #4	_____	1	0	0	0	0	0
<i>Sub-Total for ID Category:</i>				<b>11</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Location and Linkages (LL)</b> (No Minimum Points Required)				OR	Max	Y/Pts	Maybe	No	Y/Pts
<b>1. LEED ND</b>	1	LEED for Neighbourhood Development	LL2-6	10	0	0	0	0	0
<b>2. Site Selection</b>	2	Site Selection		2	0	0	0	0	0
<b>3. Preferred Locations</b>	3.1	Edge Development	LL 3.2	1	0	0	0	0	0
	3.2	Infill		2	0	0	0	0	0
	3.3	Previously Developed		1	0	0	0	0	0
<b>4. Infrastructure</b>	4	Existing Infrastructure		1	0	0	0	0	0
<b>5. Community Resources/ Transit</b>	5.1	Basic Community Resources / Transit	LL 5.2, 5.3	1	0	0	0	0	0
	5.2	Extensive Community Resources / Transit	LL 5.3	2	0	0	0	0	0
	5.3	Outstanding Community Resources / Transit		3	0	0	0	0	0
<b>6. Access to Open Space</b>	6	Access to Open Space		1	0	0	0	0	0
<i>Sub-Total for LL Category:</i>				<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Sustainable Sites (SS)</b> (Minimum of 5 SS Points Required)				OR	Max	Y/Pts	Maybe	No	Y/Pts
<b>1. Site Stewardship</b>	1.1	Erosion Controls During Construction		Prereq					
	1.2	Minimize Disturbed Area of Site		1	0	0	0	0	0
<b>2. Landscaping</b>	2.1	No Invasive Plants		Prereq					
	2.2	Basic Landscape Design	SS 2.5	2	0	0	0	0	0
	2.3	Limit Conventional Turf	SS 2.5	3	0	0	0	0	0
	2.4	Drought Tolerant Plants	SS 2.5	2	0	0	0	0	0
	2.5	Reduce Overall Irrigation Demand by at Least 20%		6	0	0	0	0	0
<b>3. Local Heat Island Effects</b>	3	Reduce Local Heat Island Effects		1	0	0	0	0	0
<b>4. Surface Water Management</b>	4.1	Permeable Lot		4	0	0	0	0	0
	4.2	Permanent Erosion Controls		1	0	0	0	0	0
	4.3	Management of Runoff from Roof		2	0	0	0	0	0
<b>5. Nontoxic Pest Control</b>	5	Pest Control Alternatives		2	0	0	0	0	0
<b>6. Compact Development</b>	6.1	Moderate Density	SS 6.2, 6.3	2	0	0	0	0	0
	6.2	High Density	SS 6.3	3	0	0	0	0	0
	6.3	Very High Density		4	0	0	0	0	0
<i>Sub-Total for SS Category:</i>				<b>22</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Water Efficiency (WE)</b> (Minimum of 3 WE Points Required)				OR	Max	Y/Pts	Maybe	No	Y/Pts
<b>1. Water Reuse</b>	1.1	Rainwater Harvesting System	WE 1.3	4	0	0	0	0	0
	1.2	Graywater Reuse System	WE 1.3	4	0	0	0	0	0
	1.3	Use of Municipal Recycled Water System		3	0	0	0	0	0
<b>2. Irrigation System</b>	2.1	High Efficiency Irrigation System	WE 2.3, 2.4	3	0	0	0	0	0
	2.2	Third Party Inspection	WE 2.3, 2.4	1	0	0	0	0	0
	2.3	Reduce Overall Irrigation Demand by at Least 45%	WE 2.4	4	0	0	0	0	0
	2.4	Non-Potable Water Irrigation System		4	0	0	0	0	0
<b>3. Indoor Water Use</b>	3.1	Fixture Efficiencies		Prereq					
	3.2	High-Efficiency Fixtures and Fittings		3	0	0	0	0	0
	3.3	Very High Efficiency Fixtures and Fittings		6	0	0	0	0	0
<i>Sub-Total for WE Category:</i>				<b>15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

LEED Canada for Homes Simplified Project Checklist (continued)

						Max	Project Points			
						Points	Preliminary	Maybe	No	Final
						Max	Y/Pts	Maybe	No	Y/Pts
<b>Energy and Atmosphere (EA)</b> (Minimum of 0 EA Points Required) OR										
1. Optimize Energy Performance	1.1	Minimum Energy Performance			Prereq					
	1.2	Exceptional Energy Performance			34	0	0		0	
2. Insulation	2.1	Basic Insulation			Prereq					
	2.2	Enhanced Insulation			2	0	0		0	
3. Air Infiltration	3.1	Reduced Envelope Leakage			Prereq					
	3.2	Greatly Reduced Envelope Leakage			2	0	0		0	
	3.3	Minimal Envelope Leakage	EA 3.2		3	0	0		0	
4. Windows	4.1	Good Windows			Prereq					
	4.2	Enhanced Windows			2	0	0		0	
	4.3	Exceptional Windows	EA 4.2		3	0	0		0	
5. Heating and Cooling Distribution System	5.1	Reduced Distribution Losses			Prereq					
	5.2	Greatly Reduced Distribution Losses			2	0	0		0	
	5.3	Minimal Distribution Losses	EA 5.2		3	0	0		0	
6. Space Heating and Cooling Equipment	6.1	Good HVAC Design and Installation			Prereq					
	6.2	High-Efficiency HVAC			2	0	0		0	
	6.3	Very High Efficiency HVAC	EA 6.2		4	0	0		0	
7. Water Heating	7.1	Efficient Hot Water Distribution			2	0	0		0	
	7.2	Pipe Insulation			1	0	0		0	
	7.3	Efficient Domestic Hot Water Equipment			3	0	0		0	
8. Lighting	8.1	ENERGY STAR Lights			Prereq					
	8.2	Improved Lighting			1.5	0	0		0	
	8.3	Advanced Lighting Package	EA 8.2		3	0	0		0	
9. Appliances	9.1	High-Efficiency Appliances			2	0	0		0	
	9.2	Water-Efficient Clothes Washer			1	0	0		0	
10. Renewable Energy	10	Renewable Energy System			10	0	0		0	
11. Residential Refrigerant Management	11.1	Refrigerant Charge Test			Prereq					
	11.2	Appropriate HVAC Refrigerants			1	0	0		0	
<i>Sub-Total for EA Category:</i>						<b>38</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Materials and Resources (MR)</b> (Minimum of 2 MR Points Required) OR										
1. Material-Efficient Framing	1.1	Framing Order Waste Factor Limit			Prereq					
	1.2	Detailed Framing Documents	MR 1.5		1	0	0		0	
	1.3	Detailed Cut List and Lumber Order	MR 1.5		1	0	0		0	
	1.4	Framing Efficiencies	MR 1.5		3	0	0		0	
	1.5	Off-site Fabrication			4	0	0		0	
2. Environmentally Preferable Products	2.1	FSC Certified Tropical Wood			Prereq					
	2.2	Environmentally Preferable Products			8	0	0		0	
3. Waste Management	3.1	Construction Waste Management Planning			Prereq					
	3.2	Construction Waste Reduction			3	0	0		0	
<i>Sub-Total for MR Category:</i>						<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Indoor Environmental Quality (EQ)</b> (Minimum of 6 EQ Points Required) OR										
1. ENERGY STAR with IAP	1	ENERGY STAR with Indoor Air Package			13	0	0		0	
2. Combustion Venting	2.1	Basic Combustion Venting Measures	EQ 1		Prereq					
	2.2	Enhanced Combustion Venting Measures	EQ 1		2	0	0		0	
3. Moisture Control	3	Moisture Load Control	EQ 1		1	0	0		0	
4. Outdoor Air Ventilation	4.1	Basic Outdoor Air Ventilation	EQ 1		Prereq					
	4.2	Enhanced Outdoor Air Ventilation	EQ 1		2	0	0		0	
	4.3	Third-Party Performance Testing	EQ 1		1	0	0		0	
5. Local Exhaust	5.1	Basic Local Exhaust	EQ 1		Prereq					
	5.2	Enhanced Local Exhaust	EQ 1		1	0	0		0	
	5.3	Third-Party Performance Testing	EQ 1		1	0	0		0	
6. Distribution of Space Heating and Cooling	6.1	Room-by-Room Load Calculations	EQ 1		Prereq					
	6.2	Return Air Flow / Room by Room Controls	EQ 1		1	0	0		0	
	6.3	Third-Party Performance Test / Multiple Zones	EQ 1		2	0	0		0	
7. Air Filtering	7.1	Good Filters	EQ 1		Prereq					
	7.2	Better Filters	EQ 7.3		1	0	0		0	
	7.3	Best Filters	EQ 7.3		2	0	0		0	
8. Contaminant Control	8.1	Indoor Contaminant Control during Construction	EQ 1		1	0	0		0	
	8.2	Indoor Contaminant Control	EQ 1		2	0	0		0	
	8.3	Preoccupancy Flush	EQ 1		1	0	0		0	
9. Radon Protection	9.1	Radon-Resistant Construction: Passive Ventilation	EQ 1		Prereq					
	9.2	Radon-Resistant Construction	EQ 1		1	0	0		0	
10. Garage Pollutant Protection	10.1	No HVAC in Garage	EQ 1		Prereq					
	10.2	Minimize Pollutants from Garage	EQ 1, 10.4		2	0	0		0	
	10.3	Exhaust Fan in Garage	EQ 1, 10.4		1	0	0		0	
	10.4	Detached Garage or No Garage	EQ 1		3	0	0		0	
<i>Sub-Total for EQ Category:</i>						<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Awareness and Education (AE)</b> (Minimum of 0 AE Points Required)										
1. Education of the Homeowner or Tenant	1.1	Basic Operations Training			Prereq					
	1.2	Enhanced Training			1	0	0		0	
	1.3	Public Awareness			1	0	0		0	
2. Education of Building Manager	2	Education of Building Manager			1	0	0		0	
<i>Sub-Total for AE Category:</i>						<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## HOME SIZE ADJUSTMENT

The Home Size Adjustment compensates for the overarching effect of home size on resource consumption by adjusting the award-level point thresholds (for certified, silver, gold, and platinum) based on home size. The adjustments are based on material and energy impacts as described below under "Rationale." The *LEED® Canada for Homes* Checklist automatically makes this adjustment when the home size and number of bedrooms are entered.

The effect of the adjustment on award thresholds can also be determined by consulting Exhibits 4–6, as described below under "Instructions." For multifamily buildings, see the "Home Size Adjustment for Multifamily Buildings" that follows.

## INSTRUCTIONS

1. Calculate the area of the home in square metres (or square feet). Follow the calculation method laid out in ANSI Standard Z765 (your Provider will have a copy) but include all finished space area that meets building code requirements for living space (e.g., head room, egress).
2. Determine the number of bedrooms in the home. For the purpose of this adjustment, a "bedroom" is any room or space that could be used or is intended to be used for sleeping purposes and meets local fire and building-code requirements. It is advantageous to count as bedrooms all rooms that meet this definition. When in doubt, consider whether the room in question might be used as a bedroom if another member were added to the household (e.g. new baby, nanny, grandparent, exchange student); if the answer is yes, count the room as a bedroom.
3. If there are 5 or fewer bedrooms, find the size of the home in the appropriate column in Exhibit 4. Read across the row to find out how many points to add or subtract. If the home is larger than the size shown in the bottom row of the applicable column, refer to Exhibit 5 to estimate the threshold adjustment, or to Exhibit 6 to calculate the adjustment.
4. If there are 6 to 10, use Exhibit 5 and/or Exhibit 6 to calculate the adjustment.
5. Add the adjustment to the number of points needed to earn the desired award level (Certified, Silver, Gold, or Platinum). A negative adjustment (for homes that are smaller than average) will lower the threshold for each award level (making it easier to reach); positive adjustments will raise the thresholds.

## EXHIBIT 4: THRESHOLD ADJUSTMENT (point range: -10 to +10)

MAXIMUM HOME SIZE (FT <sup>2</sup> ) BY NUMBER OF BEDROOMS					ADJUSTMENT TO AWARD THRESHOLDS*
1 BEDROOM	2 BEDROOMS	3 BEDROOMS	4 BEDROOMS	5 BEDROOMS	
714	1089	1497	2041	2245	-10
742	1131	1556	2121	2333	-9
772	1176	1617	2205	2425	-8
802	1222	1680	2291	2520	-7
833	1270	1746	2381	2619	-6
866	1320	1815	2475	2722	-5
900	1372	1886	2572	2829	-4
935	1425	1960	2673	2940	-3
972	1481	2037	2778	3055	-2
1010	1540	2117	2887	3175	-1
1050	1600	2200	3000	3300	0 ("neutral")
1091	1663	2286	3118	3430	+1
1134	1728	2376	3240	3564	+2
1179	1796	2469	3367	3704	+3
1225	1866	2566	3500	3850	+4
1273	1940	2667	3637	4001	+5
1323	2016	2772	3780	4158	+6
1375	2095	2881	3928	4321	+7
1429	2177	2994	4082	4491	+8
1485	2263	3111	4243	4667	+9
1543	2352	3233	4409	4850	+10
For larger homes, or homes with more bedrooms, see below.					

\*Note: As an example, an adjustment of -5 means that the threshold for a "Certified" LEED® home is 40 points (rather than 45 points for an averaged sized home). Similarly, Silver would require a minimum of 55 points rather than 60 points; Gold would require a minimum of 70; and Platinum would require a minimum of 85 points.

EXHIBIT 5: THRESHOLD ADJUSTMENT EQUATION

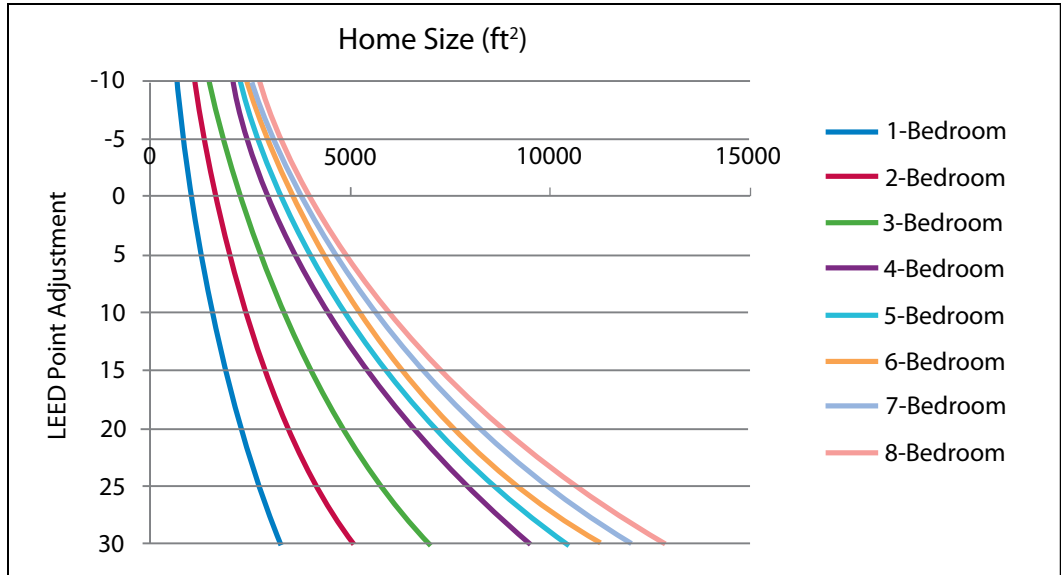
Threshold adjustment =  $18 * \log(\text{actual home size} / \text{neutral home size}) / \log(2)$

Neutral home size, as used in Exhibit 6, is determined according to the following table:

BEDROOMS	≤1	2	3	4	5	6 OR MORE
Neutral home size (ft <sup>2</sup> )	1050	1600	2200	3000	3300	250 ft <sup>2</sup> more for each additional bedroom

Note: For homes with more than 5 to 10 bedrooms, "neutral home size" is defined as follows:  
 $3300 + [250 * (\text{number of bedrooms} - 5)]$

EXHIBIT 6: THRESHOLD ADJUSTMENT CURVES (point range: -10 and above)



## RATIONALE

All things being otherwise equal, a large home consumes more materials and energy than a small home over its lifecycle (including pre-construction, construction, use, and demolition or deconstruction). The adjustment compensates for these impacts by making it easier or harder to reach each *LEED® Canada for Homes* certification level. There is no impact on award thresholds for average-sized homes, whereas thresholds for smaller-than-average homes are lowered and thresholds for larger-than-average homes are raised.

Data from the U.S. Census Bureau in the *American Housing Survey for 2005* shows a strong correlation between number of bedrooms and number of occupants. Although a home may serve many different households over its lifespan, in general, a home with more bedrooms will serve more people. The adjustment therefore categorizes homes by the number of bedrooms.

The relationship between home size and LEED® points is based on estimated energy and materials impacts within the context of the *LEED® Canada for Homes Rating System*. Available published data and informal studies of energy and materials usage in homes reveal two key relationships:

- A 100% increase in home size yields an increase in annual energy usage of 15% to 50%, depending on the design, location, and occupants of the home.
- A 100% increase in home size yields an increase in materials usage of 40% to 90%, depending on the design and location of the home.

These data were simplified and generalized to the assumption that as home size doubles, energy consumption increases by roughly one-quarter and material consumption increases by roughly one-half; combined, these amount to an increase in impact of roughly one-third with each doubling in home size. Thus the point adjustment equates to one-third of the points available in the Materials & Resources and Energy & Atmosphere categories combined for each doubling in home size.

## HOME SIZE ADJUSTMENT FOR MULTIFAMILY BUILDINGS

The *Weighted Average Home Size Adjustment* (WAHSA) for the building may be calculated as follows:

$$\text{WAHSA} = \frac{[\sum \text{by unit type (adjustment for unit * number of units of that type of project)}]}{\text{total number of units in project}}$$

where *home size adjustment for unit* is equal to the point adjustment from Exhibit 4 or Exhibit 6 above, based on the average floor area for all units of that type.

### EXAMPLE

#### 1-Bedroom Units

Number of Units:	10
Total Floor Area for 1BR Units:	771 m <sup>2</sup> (8,300 sq ft)
Average Area / Unit:	77 m <sup>2</sup> (830 sq ft)
Home Size Adjustment (1 bedroom):	-7 points

#### 2-Bedroom Units

Number of Units:	5
Total Floor Area for 2BR Units:	674 m <sup>2</sup> (7,250 sq ft)
Average Area / Unit:	135 m <sup>2</sup> (1450 sq ft)
Home Size Adjustment (2 bedrooms):	-3 points

#### Overall Home Size Adjustment

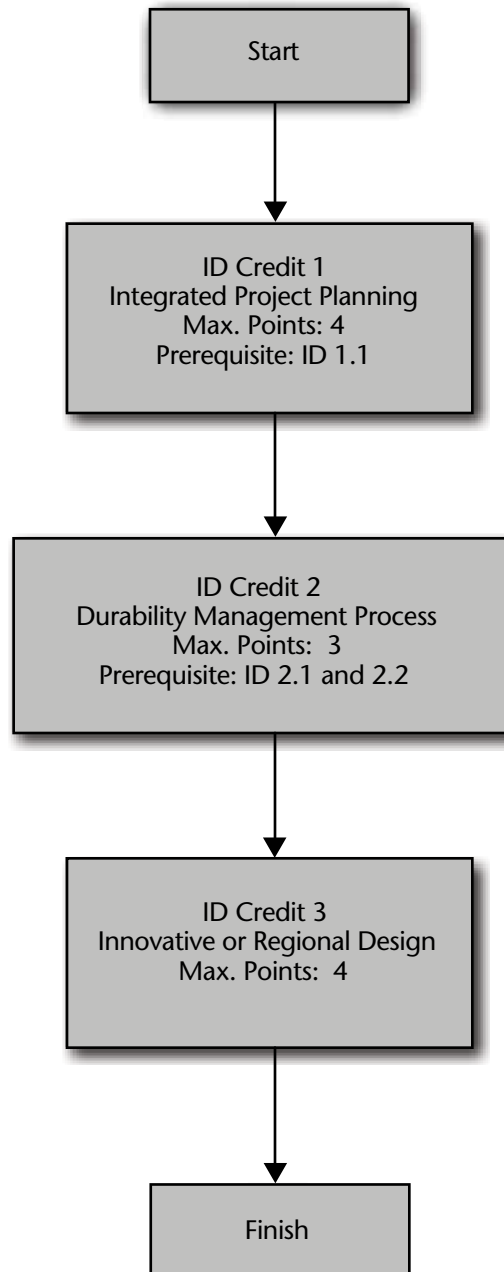
Weighted Average Home Size Adjustment

$$\begin{aligned} &= [(1\text{BR score} * 1\text{BR units}) + (2\text{BR score} * 2\text{BR units})] \div \text{total units} \\ &= [(-2 * 10) + (-3 * 5)] / 15 \\ &= -2 \end{aligned}$$

Thus, the *LEED® Canada for Homes* award thresholds for this multifamily building are Certified, 44 points; Silver, 59 points; Gold, 74 points; and Platinum, 89 points.

# INNOVATION & DESIGN PROCESS (ID)

## PATHWAY THROUGH THE ID CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# INNOVATION AND DESIGN PROCESS

## INTEGRATED PROJECT PLANNING

### INTENT

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

### REQUIREMENTS

#### PREREQUISITE

#### 1.1 Preliminary Rating.

As early as is practical, conduct a preliminary *LEED® Canada 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® Canada for Homes* credits that have been selected to meet the targeted award level.
- The party accountable for meeting the *LEED® Canada for Homes* requirements for each selected credit.

#### CREDITS

#### 1.2 Integrated Project Team (1 point).

Assemble and involve a project team to meet the three criteria below:

- a. Include team members, not including the builder and Green Rater, 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
  - civil engineering, landscape architecture, habitat restoration, or land-use planning

b. Actively 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
- construction

c. Conduct meetings with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems encountered, formulate solutions, review responsibilities and identify next steps. If a project is on hold or inactive, monthly meetings are not required.

ID	LL	SS	WE	EA	MR	EQ	AE
1							

**1.3 LEED® Residential Accredited Professional** (1 point).

At least one principal member of the project team shall be a professional who is credentialed with respect to *LEED® Canada for Homes* as determined by the Canada Green Building Council and the Green Building Certification Institute. A LEED® AP certified under the commercial systems (LEED® Canada NC, LEED® Canada CI, etc.) is not eligible for this point.

**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 Credit 1.2. Use the workshop to integrate green strategies across all aspects of the building design, drawing on the expertise of all participants.

ID	LL	SS	WE	EA	MR	EQ	AE
1							

### 1.5 Building Orientation for Solar Design (maximum, 1 point).

This credit has 5 optional measures. Any two measures completed together will gain half a point, and any four measures will gain 1 point. No extra points can be earned for doing all five.

- 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 42 square metres (450 sq ft) 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.
- e. Include a dual purpose plumbing/electrical chase from the mechanical room to the attic, plus plumbing for the installation of a solar hot-water system according to the guidelines from CanSIA's Solar Ready program and the CAN/CSA-F383-87 Installation Code for Solar Domestic Hot Water Systems.

### 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.

# INNOVATION AND DESIGN PROCESS

## DURABILITY MANAGEMENT PROCESS

ID	LL	SS	WE	EA	MR	EQ	AE
2							

### INTENT

Promote durability and high performance of the building enclosure and its components and systems through appropriate design, materials selection, and construction practices.

### REQUIREMENTS

Note: The CaGBC and its representatives are responsible only for verifying the completion of *LEED® Canada for Homes* requirements; such verification in no way constitutes a warranty as to the appropriateness of the selected durability measures or the quality of implementation (see Disclaimer, page 2).

#### PREREQUISITES

##### **2.1 Durability Planning.**

Prior to construction, the project team shall do the following:

- a. Complete the Durability Risk Evaluation Form to identify all moderate- and high-risk durability issues for the building enclosure.
- b. Develop specific measures to respond to those issues.
- c. Identify and incorporate all the applicable indoor moisture control measures listed in Table 1.
- d. Incorporate the measures from 2.1(b) and (c), above, into project documents (drawings, specifications, and/or scopes of work, as appropriate).
- e. List all the durability measures and indicate their locations in the project documents in a durability inspection checklist. Include the checklist in project documents for use in verification.

##### **2.2 Durability Management.**

During construction, the builder shall have a quality management process in place to ensure installation of the durability measures. This prerequisite can be satisfied by having the builder inspect and check off each measure in the durability inspection checklist created for ID Prerequisite 2.1(e), above.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## CREDITS

**2.3 Third-Party Durability Management Verification** (3 points).

Have the Green Rater inspect and verify each measure listed in the durability inspection checklist created for ID Prerequisite 2.1(e), above.

TABLE 1. INDOOR MOISTURE CONTROL MEASURES

LOCATION OR EQUIPMENT	REQUIRED MOISTURE CONTROL MEASURE
Tub, showers, and spa areas	Use nonpaper-faced backer board on walls behind fiberglass surrounds. It is not acceptable to use behind tile.
Kitchen, bathroom, laundry rooms, and spa areas	Use water-resistant flooring; do not install carpet.
Entryway [within 1 square metre (3 sq ft) of exterior door]	Use water-resistant flooring; do not install carpet.
Tank water heater in or over living space	Install drain and drain pan.
Clothes washer in or over living space	Install drain and drain pan, or install accessible single-throw supply valve.
Conventional clothes dryer	Exhaust directly to outdoors.
Condensing clothes dryer	Install drain and drain pan.

## SYNERGIES AND TRADE-OFFS

Many of the credits in the *LEED® Canada for Homes* Rating System can serve as durability strategies and may be used in the creation of a durability inspection checklist. In this case both credits will be received.

# INNOVATION AND DESIGN PROCESS

## INNOVATIVE OR REGIONAL DESIGN

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

### INTENT

Minimize the environmental impact of the home by incorporating additional green design and construction measures that have tangible and demonstrable benefits beyond those in the *LEED® Canada for Homes* Rating System.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **3.1 Innovation 1** (1 point).

Prepare a written Innovative Design Request, to be submitted by the *LEED® Canada for Homes* Provider to the CaGBC, explaining the merits of the proposed measure. This point should not be counted until *LEED® Canada for Homes* has ruled on the request. All written submittals must contain the following:

- the intent of the proposed measure;
- the proposed requirement for compliance;
- the proposed documentation to demonstrate compliance; and
- a description and an estimate of the benefit or impact provided by the proposed measure.

#### **3.2 Innovation 2** (1 point).

#### **3.3 Innovation 3** (1 point).

#### **3.4 Innovation 4** (1 point).

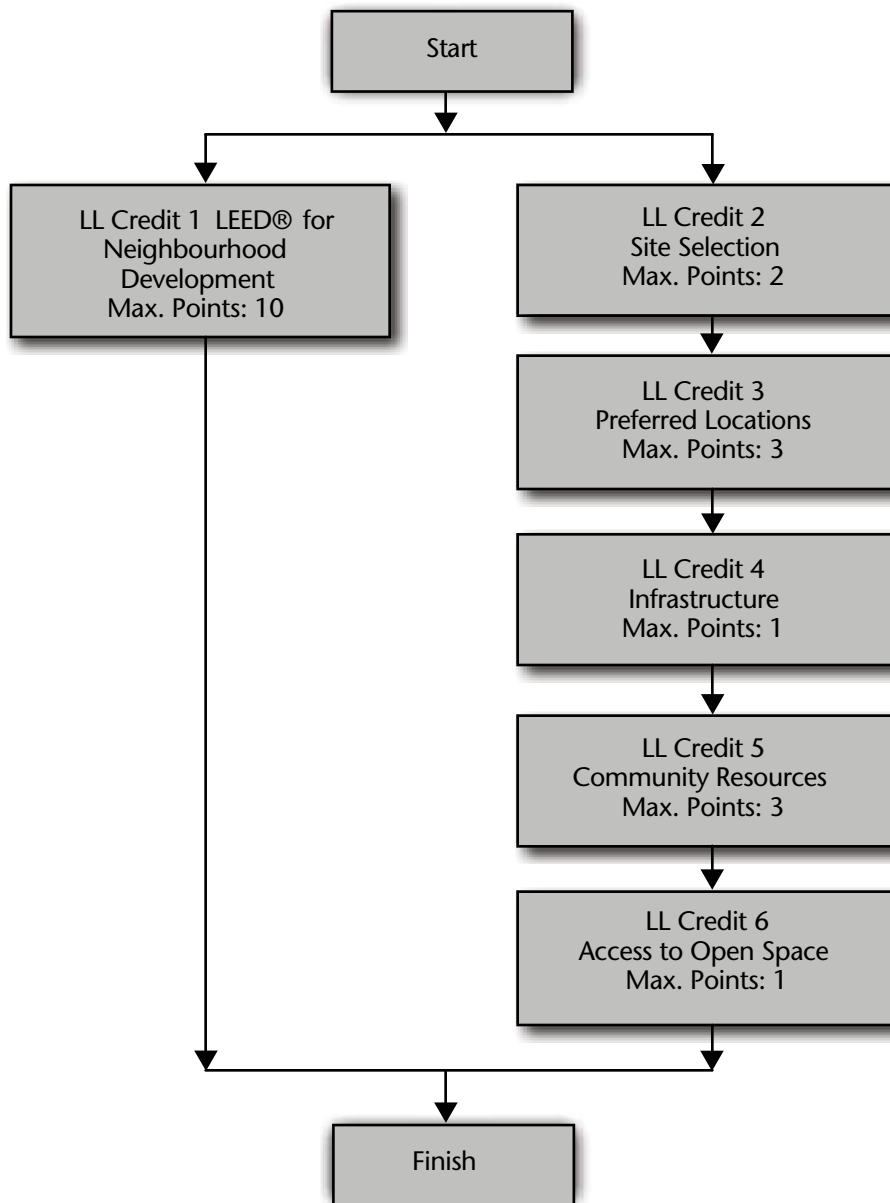
### SYNERGIES AND TRADE-OFFS

This credit rewards innovative or regional measures that are not addressed elsewhere in the Rating System. A project can also receive 1 LEED® point for exceeding the performance requirements of existing credits.



# LOCATION & LINKAGES (LL)

## OPTIONAL PATHWAYS THROUGH THE LL CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# LOCATION & LINKAGES

## LEED® FOR NEIGHBOURHOOD DEVELOPMENT

### INTENT

Minimize the environmental impact of land development practices by building homes in LEED® for Neighbourhood Development certified developments.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **1.1 LEED® for Neighborhood Development** (10 points).

Complete the stage 2 requirements of the LEED® for Neighbourhood Development (LEED-ND) certification program. Until LEED® Canada ND is available, these credits will use the USGBC LEED-ND certification.

### SYNERGIES AND TRADE-OFFS

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

# LOCATION & LINKAGES

## SITE SELECTION

ID	LL	SS	WE	EA	MR	EQ	AE
2							

### INTENT

Avoid development on environmentally sensitive sites.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **2.1 Site Selection** (2 points).

Do not develop buildings, built structures, roads, or parking areas on portions of sites that meet any of the following criteria:

- a. Previously undeveloped land whose elevation is either lower than 1500mm (5 ft) above the elevation of the 100-year flood plain OR lower than 900mm (3 ft) above the elevation of the 200-year flood plain.
- b. Ecologically sensitive land (see glossary for definitions).
- c. Within 30.5m (100 ft) of any water or wetland (see glossary for definitions). New wetlands constructed as part of storm water mitigation or other site-restoration efforts are exempt from this part of the requirement.
- d. Land which prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner. (Projects owned by the park are exempt.)
- e. Land that is part of a Provincial Agricultural Land Reserve or Forest Land Reserve (see glossary for definitions), where such designation exists.

### SYNERGIES AND TRADE-OFFS

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

ID	LL	SS	WE	EA	MR	EQ	AE
3							

## LOCATION & LINKAGES

### PREFERRED LOCATIONS

#### INTENT

Encourage the building of LEED® homes 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 multihome new development, each home 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 multihome new development, each home in the development is awarded these points if at least 75% of the development site immediately borders previously developed land.

#### **AND/OR**

#### **3.3 Previously Developed** (1 point).

Build on a previously developed lot. In the case of a multihome new development, each home in the development is awarded this point if at least 75% of the development site is built on previously developed land.

#### SYNERGIES AND TRADE-OFFS

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

# LOCATION & LINKAGES

## INFRASTRUCTURE

ID	LL	SS	WE	EA	MR	EQ	AE
<b>4</b>							

### INTENT

Encourage the building of LEED® homes in developments that are served by or are near existing infrastructure (i.e., sewers and water supply).

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

##### **4.1 Existing Infrastructure** (1 point).

Select a lot that is within 800 metres of existing water service lines and sewer service lines. In the case of a multihome new development, each home in the development is awarded this point if the centre of the development site is within 800 metres of existing water service lines and sewer service lines.

### SYNERGIES AND TRADE-OFFS

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

ID	LL	SS	WE	EA	MR	EQ	AE
5							

# LOCATION & LINKAGES

## COMMUNITY RESOURCES / TRANSIT

### INTENT

Encourage the building of LEED® homes in development patterns that allow for walking, biking, or public transit (thereby minimizing dependency on personal automobiles and their associated environmental impacts).

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

Note: For multihome new developments, the distances below can be measured from the centre of the community as long as the distance from the centre of the community to the farthest home does not exceed 400 metres. Using this approach, whole communities can qualify for this credit. For any homes farther than 400 metres from the centre of the community, distances must be recalculated for each home.

#### **5.1 Basic Community Resources / Transit** (1 point).

Select a site that meets one of the following criteria:

- a. Located within 400 metres of four basic community resources (Table 2).
- b. Located within 800 metres of seven basic community resources (Table 2).
- c. Located within 800 metres of transit services that offer 30 or more transit rides per weekday (combined bus, rail, and ferry).

#### **OR**

#### **5.2 Extensive Community Resources / Transit** (2 points).

Select a site that meets one of the following criteria:

- a. Located within 400 metres of seven basic community resources (Table 2).
- b. Located within 800 metres of 11 basic community resources (Table 2).
- c. Located within 800 metres of transit services that offer 60 or more transit rides per weekday (combined bus, rail, and ferry).

OR

**5.3 Outstanding Community Resources / Transit** (3 points).

Select a site that meets one of the following criteria:

- a. Located within 400 metres of 11 basic community resources (Table 2).
- b. Located within 800 metres of 14 basic community resources (Table 2).
- c. Located within 800 metres of transit services that offer 125 or more transit rides per weekday (combined bus, rail, and ferry).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>5</b>							

Note: Transit rides per weekday are calculated as follows: (1) within a 400-metre 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 400 metres together. Example: if there are four 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.

TABLE 2. TYPES OF BASIC COMMUNITY RESOURCES

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

Note: Up to two of each type of community resource may be counted. For example, two restaurants within 400 meters may be counted as two community resources; four restaurants also count as two.

**SYNERGIES AND TRADE-OFFS**

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

ID	LL	SS	WE	EA	MR	EQ	AE
6							

## LOCATION & LINKAGES

### ACCESS TO OPEN SPACE

#### INTENT

Provide open spaces to encourage walking, physical activity, and time spent outdoors.

#### REQUIREMENTS

##### PREREQUISITES

None.

##### CREDITS

#### **6.1 Access to Open Space** (1 point).

Select a location within 400 meters of a publicly accessible or community-based open space that is at least 0.3 hectares ( $\frac{3}{4}$  acre) in size. The open space requirement can be met by either one large open space or two smaller spaces totaling 0.3 hectares ( $\frac{3}{4}$  acre).

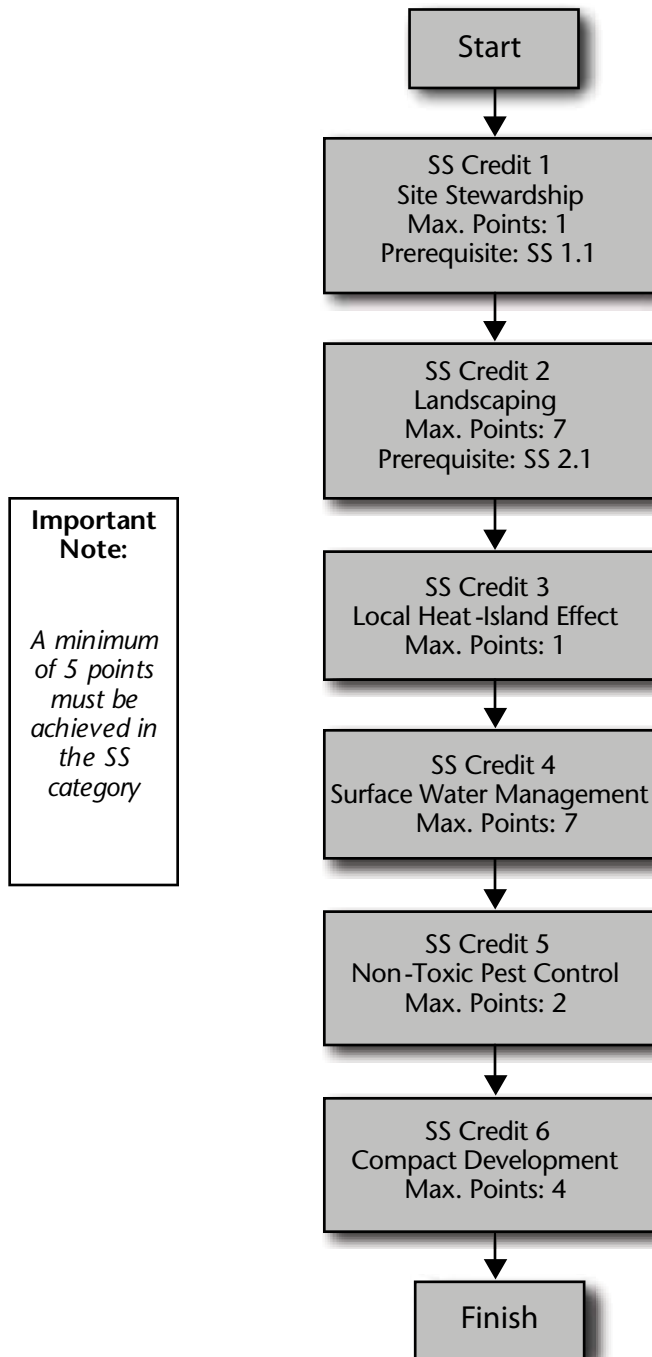
Note: Open spaces must consist predominantly of softscapes such as soil, grass, shrubs, and trees. These include natural open spaces; city and provincial parks; play areas; and other community open spaces specifically intended for recreational use. Areas around ponds can be counted as open space if they have usable and accessible space such as a walking or bicycle path. Private lands open to the public for passive recreation are also acceptable provided there is deeded public access or a history of allowable public use and anticipated continued future public use for at least 10 years.

#### SYNERGIES AND TRADE-OFFS

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

# SUSTAINABLE SITES (SS)

## PATHWAY THROUGH THE SS CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# SUSTAINABLE SITES

## SITE STEWARDSHIP

### 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 (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 Credit 2.2 (see Note 2 below).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

**OR**

- d. Build on site with a lot area of less than 0.06 hectares (1/7 acre), or with housing density for the project that is equal to or greater than 17 units per hectare (7 units per acre). For multifamily buildings, 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 when establishing any new landscaping.
2. Homes that meet SS Credit 2.2 for the entire lot can count points in both this credit and SS Credit 2.2 (for 3 points total). SS Credit 1.2 (d) applies only to the area of the lot not disturbed during construction. SS Credit 2.2 applies to the area of the lot that is disturbed during construction.

**SYNERGIES AND TRADE-OFFS**

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

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

ID	LL	SS	WE	EA	MR	EQ	AE
2							

# SUSTAINABLE SITES

## LANDSCAPING

### 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 Canadian Botanical Conservation Network's national invasive plants list for your area: [http://www.rbg.ca/abcn/en/projects/invasives/i\\_list.html](http://www.rbg.ca/abcn/en/projects/invasives/i_list.html).

Note that not all non-native 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 either by the homeowner association or by other rule 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 this plan to the homeowner.

**2.2 Basic Landscape Design** (2 points).

Meet the following requirements for all designed landscape softscapes:

- Any turf must be drought-tolerant.
- Do not use turf in densely shaded areas.
- Do not use turf in areas with a slope of 25% (i.e., 4:1 slope).
- 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.
- All compacted soil (e.g., from construction vehicles) must be tilled to at least 150 mm (6 inches).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

**AND/OR****2.3 Limit Conventional Turf** (maximum 3 points, as specified in Table 3).

Limit the use of conventional turf (including drought-tolerant turf), in the designed landscape softscapes.

TABLE 3. LIMITED CONVENTIONAL TURF

PERCENTAGE OF DESIGNED LANDSCAPE SOFTSCAPE AREA THAT IS CONVENTIONAL TURF	POINTS
41–60%	1
21–40%	2
20% OR LESS	3

**AND/OR****2.4 Drought-Tolerant Plants** (maximum 2 points, as specified in Table 4).

Install drought-tolerant plants.

TABLE 4. DROUGHT-TOLERANT PLANTS

PERCENTAGE OF INSTALLED PLANTS THAT ARE DROUGHT-TOLERANT	POINTS
45–89%	1
90% or more	2

ID	LL	SS	WE	EA	MR	EQ	AE
2							

OR

**2.5 Reduce Overall Irrigation Demand by at Least 20%**

(maximum 6 points, as specified in Table 5)

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.

TABLE 5. REDUCTION IN WATER DEMAND

REDUCTION IN ESTIMATED IRRIGATION WATER USAGE	SPECIES FACTOR (K <sub>s</sub> )		
	SS 2.5 POINTS	WE 2.3 POINTS	TOTAL POINTS
20–24%	2	0	2
25–29%	3	0	3
30–34%	4	0	4
35–39%	5	0	5
40–44%	6	0	6
45–49%	6	1	7
50–54%	6	2	8
55–59%	6	3	9
60% or more	6	4	10

**METHOD FOR CALCULATING REDUCTION IN IRRIGATION DEMAND****Step 1.** Calculate the baseline irrigation water usage:

$$\text{Baseline Usage} = \text{Landscaped Area} * ET_0 * 0.62$$

where  $ET_0$  = Baseline Evapotranspiration Rate  
(available from regional agricultural data)

**Step 2.** Calculate the design case irrigation water usage:

$$\text{Design Case Usage} = (\text{Landscaped Area} * ET_L \div IE) * CF * 0.62$$

where  $ET_L = ET_0 * K_L$  and  $K_L = K_S * K_{MC}$ . Refer to Tables 6 and 7 for values for  $K_S$  and  $K_{MC}$ , and to Table 8 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:

$$\text{Percentage Reduction} = (1 - \text{Design Case Usage} \div \text{Baseline Usage}) * 100$$

**Step 4.** Refer to Table 5, above, to determine points earned.

TABLE 6. 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

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

TABLE 7. 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 8. 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

## SYNERGIES AND TRADE-OFFS

A project receiving points in SS Credit 2.5 should also refer to WE Credit 2.3.

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

ID	LL	SS	WE	EA	MR	EQ	AE
3							

# SUSTAINABLE SITES

## LOCAL HEAT ISLAND EFFECTS

### INTENT

Design landscape features to reduce local heat island effects.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **3.1 Reduce Local Heat Island Effects** (1 point).

Do one of the following:

- a. Locate trees or other plantings to provide shading for at least 50% of sidewalks, patios, and driveways within 15 metres (50 ft) of the home. 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 sidewalks, patios, and driveways within 15 metres (50 ft) of the home. Acceptable strategies include the following:
  - white concrete
  - open pavers (counting only the vegetation, not the pavers)
  - any material with a solar reflectance index (SRI) of at least 29

### SYNERGIES AND TRADE-OFFS

Shading hardscapes around the home can reduce irrigation needs as well as temper the home's outdoor environment and reduce cooling loads.

Providing shade is addressed in two other credits: EA Credit 1.2 (Exceptional Energy Performance); and SS Credit 4.3 (b) and (c) (Vegetated Roof).

Locating fences, trees, shrubs, or other plantings appropriately can capture or deflect seasonal breezes.

# SUSTAINABLE SITES

## SURFACE WATER MANAGEMENT

ID	LL	SS	WE	EA	MR	EQ	AE
<b>4</b>							

### INTENT

Design site features to minimize erosion and runoff from the home 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 (maximum 4 points, as specified in Table 9).

Design the lot such that at least 70% of the buildable land, 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 150-mm (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 19-litre (5-gallon) shrubs, or 4.6 square metres (50 sq ft) of native groundcover per 46 square metre (500 sq ft) of disturbed lot area (including area under roof).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>4</b>							

**4.3 Management of Runoff from Roof** (maximum 2 points).

Design and install one or more of the following runoff control measures:

- a. Install permanent stormwater controls (e.g., vegetated swales, on-site rain garden, dry well, or rainwater cistern) designed to manage runoff from the home (1 point).
- b. Install vegetated roof to cover 50% of the roof area (0.5 point).

**OR**

- c. Install vegetated roof to cover 100% of the roof area (1 point).
- d. Have the site designed by a licensed or certified landscape design or engineering professional such that all water runoff from the home is managed through an on-site design element (2 points).

TABLE 9. PERMEABLE AREA

PERCENTAGE OF BUILDABLE LAND (EXCLUDING AREA UNDER ROOF) THAT IS PERMEABLE	POINTS
70–79%	1
80–89%	2
90–99%	3
100%	4

**SYNERGIES AND TRADE-OFFS**

SS 1.1 addresses erosion control during construction.

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.

# SUSTAINABLE SITES

## NON-TOXIC PEST CONTROL

ID	LL	SS	WE	EA	MR	EQ	AE
5							

### INTENT

Design home features to minimize the need for poisons for control of insects, rodents, and other pests.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

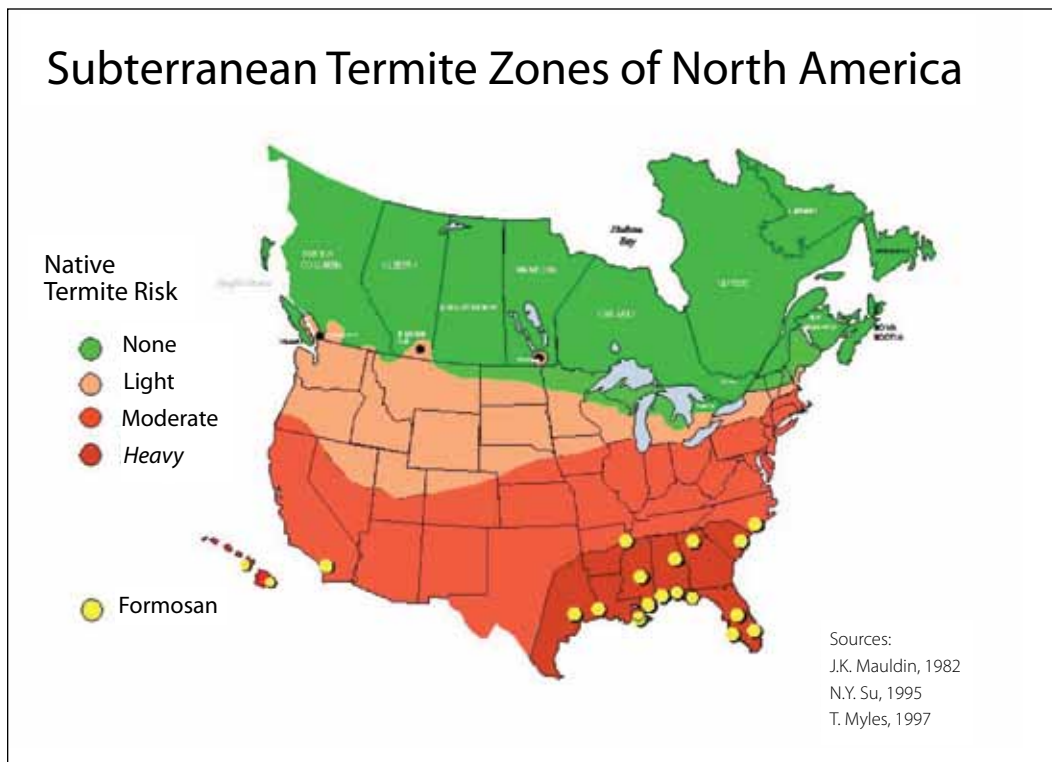
#### **5.1 Pest Control Alternatives** (0.5 point each, maximum 2 points).

Implement one or more of the measures below. All physical actions (for pest management practices) must be noted on construction plans.

- a. Keep all wood (i.e., siding, trim, structure) at least 300 mm (12 inches) above soil.
- b. Seal all external cracks, joints, penetrations, edges, and entry points with caulking. Where openings cannot be caulked or sealed, install rodent- and corrosion-proof screens (e.g., copper or stainless-steel mesh). Protect exposed foundation insulation with moisture-resistant, pest-proof cover (e.g., fibre cement board, galvanized insect screen).
- c. Include no wood-to-concrete connections or separate any exterior wood-to-concrete connections (e.g., at posts, deck supports, stair stringers) with metal or plastic fasteners or dividers.
- d. Install landscaping such that all parts of mature plants will be at least 600 mm (24 inches) from the home.
- e. In areas marked "light" on the Termite Infestation Probability Map (Figure 1), implement one or more of the following measures (0.5 point each):
  - i. Treat all cellulosic material (e.g., wood framing, composite and engineered wood products, etc.) with a borate product to a minimum of 1 metre (3 ft) above the foundation.
  - ii. Install a sand or diatomaceous earth barrier.
  - iii. Install a steel mesh barrier termite control system.
  - iv. Install non-toxic termite bait system.
  - v. Use noncellulosic (i.e., not wood or straw) wall structure.
  - vi. Use solid concrete foundation walls or masonry walls with top course of solid block bond beam or concrete-filled block.

ID	LL	SS	WE	EA	MR	EQ	AE
5							

FIGURE 1. TERMITE INFESTATION PROBABILITY MAP



Source: Canadian Wood Council

### SYNERGIES AND TRADE-OFFS

Limiting conventional turf and installing native plants (SS 2) can help reduce the need for fertilizers and pesticides that contain toxic chemicals.

Keeping plants away from the home makes it unnecessary to irrigate close to the home and risk leaking moisture into the home’s foundation.

The thermal bypass inspection, required in the EA credit category, addresses cracks, joints, and penetrations in the building envelope.

# SUSTAINABLE SITES

## COMPACT DEVELOPMENT

ID	LL	SS	WE	EA	MR	EQ	AE
<b>6</b>							

### 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** (2 points).

Build homes with an average housing density of 17 or more dwelling units per hectares (7 per acre) of buildable land. A single home on a 0.06-hectare (1/7-acre) buildable lot qualifies.

#### **OR**

#### **6.2 High Density** (3 points).

Build homes with an average housing density of 25 or more dwelling units per hectares (10 per acre) of buildable land. A single home on a 0.04-hectare (1/10-acre) buildable lot qualifies.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>6</b>							

**OR****6.3 Very High Density** (4 points).

Build homes with an average housing density of 49 or more dwelling units per hectare (20 per acre) of buildable land. A single home on a 0.02-hectare (1/20-acre) buildable lot qualifies.

Note: Buildable land area is calculated as follows:

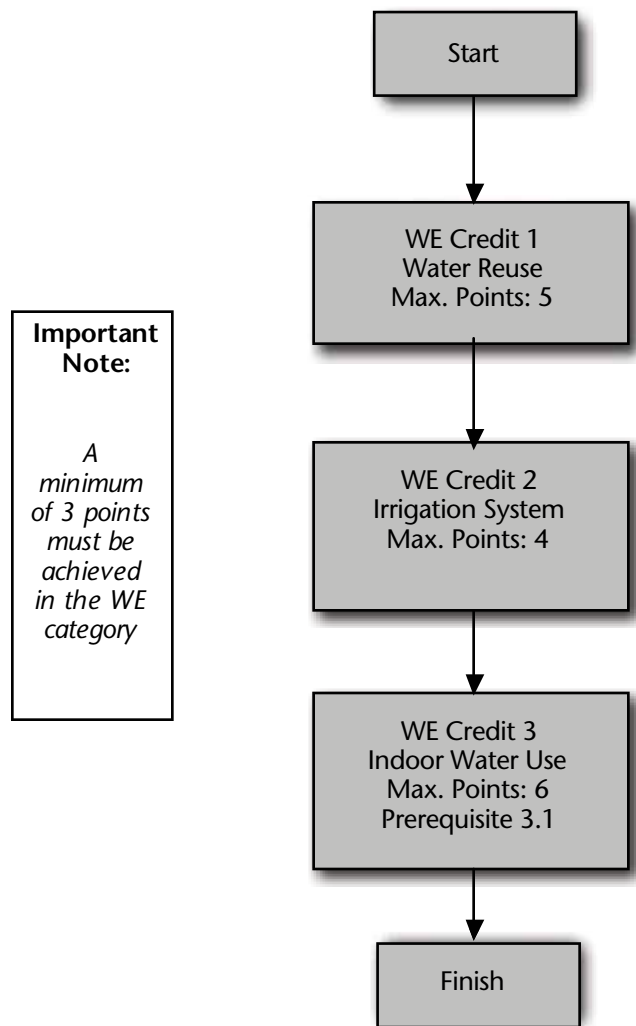
- Exclude public streets or public rights of way, land occupied by non-residential structures, public parks, and land excluded from residential development by law.
- For multiple-lot developments, include only the sum of the lot areas for homes being built for *LEED® Canada for Homes*.
- The numerator 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.

**SYNERGIES AND TRADE-OFFS**

SS 1.2 is automatically granted to moderate, high, or very high density homes because of the reduced impact of compact development.

# WATER EFFICIENCY (WE)

## PATHWAY THROUGH THE WE CATEGORY



ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
1							

# WATER EFFICIENCY

## WATER REUSE

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

Note: Rainwater and greywater 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 greywater. Many provinces and regulatory agencies require that water going into a toilet or sink meet potable water standards; builders should comply with local codes.

#### **1.1 Rainwater Harvesting System** (A total of 5 points can be awarded for 1.1 and 1.2).

Design and install a roof runoff rainwater harvesting and storage system for landscape irrigation use or indoor water use. The storage system must be sized to hold all the water from a 25-mm (1 inch) rainfall event, taking into consideration the size of the harvest system (e.g. 50% or 75% of total roof area, depending on the measure chosen from Table 10).

#### **AND/OR**

#### **1.2 Greywater Reuse System** (A total of 5 points can be awarded for 1.1 and 1.2).

Design and install a greywater reuse system for landscape irrigation use (i.e., not a septic system) or indoor water use. The system must include a tank or dosing basin that can be used as part of the irrigation system. Greywater must be collected from at least one of the following:

- clothes washer;
- showers;
- some combination of faucets and other sources estimated to exceed 19,000 litres (5,000 gallons) per year.

Design and install a greywater reuse system for landscape irrigation use (i.e., not a septic system) or indoor water use. The kitchen sink, bathroom sink, shower/tub, and laundry are each considered a greywater source. For each source,  $\geq 66\%$  or equivalent should be recovered and reused. Note that greywater systems are subject to local codes and may require special permits (see reference guide for more detail).

**OR****1.3 Use of Municipal Recycled Water System** (3 points).

Design the plumbing such that irrigation-system water demand is supplied by municipal recycled water. This is applicable only in communities with a municipal recycled-water program.

ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
<b>1</b>							

TABLE 10. LEED® POINTS ASSOCIATED WITH DIFFERENT NON-POTABLE WATER REUSE MEASURES

HARVESTING LOCATION	APPLICATION	LEED® POINTS (5 MAXIMUM)
≥ 50% of roof area	Indoor	2 points
≥ 50% of roof area	Outdoor	3 points
≥ 75% of roof area	Indoor <i>and</i> Outdoor	4 points
<b>AND/OR</b>		
Any One Greywater Source	Indoor or outdoor	2 points
Any Two Greywater Sources	Outdoor	3 points
Any Three Greywater Sources	Indoor <i>and</i> Outdoor	4 points

Note: CSA B-128 provides standards for the plumbing of non-potable water reuse systems. In most Canadian municipalities, local plumbing officials and in some cases local public health officials must sign off on water reuse installations.

**SYNERGIES AND TRADE-OFFS**

A project receiving points for WE 1.3 cannot receive points for WE 1.1 and WE 1.2. Rainwater harvesting and greywater reuse irrigation systems should be integrated with resource-efficient landscape (SS 2) and irrigation system design (WE 2).

ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
2							

# WATER EFFICIENCY

## IRRIGATION SYSTEM

### 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** (1 point each, maximum 3 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. Irrigation Timer: Install a timer or controller that activates the valves for each watering zone at the best time of the day.
- 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 pressure-regulating devices to maintain optimal pressure and prevent misting.
- h. Utilize high-efficiency nozzles with an average distribution uniformity (DU) of at least 0.70. This may include conventional rotors, multistream rotators, 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.
- i. Check valves in heads.
- j. 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 as a result of heat, wind, etc.

**AND/OR**

ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
<b>2</b>							

**2.2 Third-Party Inspection** (1 point).

Have a third-party inspection of the irrigation system in operation performed, including observation of all of the following:

- a. All spray heads are operating and delivering water only to intended zones.
- b. Any switches or shut-off valves are working properly.
- c. Any timers or controllers are set properly.
- d. Any irrigation systems are located at least 600 mm (2 feet) from the home.
- e. Irrigation spray does not hit the home.

**OR**

**2.3 Reduce Overall Irrigation Demand by at Least 45%** (maximum 4 points, as specified in Table 11).

Design the landscape and irrigation system to reduce the overall irrigation-water budget. The estimates must be calculated and prepared by a landscape professional, biologist, or other qualified professional using the method outlined below.

Note: A project must earn full points in SS 2.5 to receive points for this credit.

**OR**

**2.4 Non-Potable Water Irrigation System** (4 points).

Design and install an irrigation system that uses only non-potable water (rainwater or greywater) harvested on site.

Note: Temporary irrigation systems used for plant establishment are allowed, only if removed within one year.

TABLE 11. REDUCTION IN WATER DEMAND

REDUCTION IN ESTIMATED IRRIGATION WATER USAGE	WE 2.3 POINTS	SS 2.4 POINTS	TOTAL POINTS
45–49%	1	6	7
50–54%	2	6	8
55–59%	3	6	9
60% or more	4	6	10

ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
<b>2</b>							

## METHOD FOR CALCULATING REDUCTION IN IRRIGATION DEMAND

**Step 1.** Calculate the baseline irrigation water usage:

$$\text{Baseline Usage} = \text{Landscaped Area} * ET_0 * 0.62$$

where  $ET_0$  = Baseline Evapotranspiration Rate (available from local and provincial Departments of Agriculture)

**Step 2.** Calculate the design case irrigation water usage:

$$\text{Design Case Usage} = (\text{Landscaped Area} * ET_L \div IE) * CF * 0.62$$

where  $ET_L = ET_0 * K_L$  and  $K_L = K_S * K_{MC}$ . Refer to Tables 12 and 13 for values for  $K_S$  and  $K_{MC}$ , and to Table 14 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:

$$\text{Percentage Reduction} = (1 - \text{Design Case Usage} \div \text{Baseline Usage}) * 100$$

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

TABLE 12. 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 13. 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 14. IRRIGATION EFFICIENCY

IRRIGATION TYPE	IRRIGATION EFFICIENCY (IE)	
	LOW	HIGH
Fixed spray	0.4	0.6
Impact and micro spray	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

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## SYNERGIES AND TRADE-OFFS

A project can receive points for WE 2.3 or 2.4 or WE 2.1 and 2.2.

A project receiving points for WE 2.3 must achieve full points in SS 2.4.

This irrigation system design must address all aspects of the landscape design, including any features from SS 2, as well as any rainwater harvesting or greywater reuse system (WE 1).

Outdoor water savings are also achieved by designing and installing water efficient landscaping. LEED® points for landscape related water savings are included in SS 2.

Greywater and/or rainwater reuse systems should be included in overall outdoor water use designs even if credit WE 2.4 is not pursued.

ID	LL	SS	<b>WE</b>	EA	MR	EQ	AE
3							

# WATER EFFICIENCY

## INDOOR WATER USE

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

#### **3.1 Fixture efficiencies.**

Fixtures must not consume more water than the following:

Toilets: 6.00 litres per flush (1.60 gallons per flush)

#### CREDITS

Note: The average flush rate of dual-flush toilets is calculated as follows:

#### **Dual flush toilet rate= (2\*liquid flush rate + solid flush rate)/3**

Compensating shower valves and conventional, non-compensating shower valves may not work properly when low-flow showerheads [restricting water flow below 9.50 LPM (2.50 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.

See the *LEED® Canada for Homes Reference Guide* for more information.

**3.2 High Efficiency Fixtures and Fittings** (1 point each, maximum 3 points).

Meet one or more of the following requirements through installation of high efficiency (low-flow) fixtures:

- Average flow rate for all lavatory faucets must be  $\leq 7.50$  LPM (2.00 GPM);
- Average flow rate for all showerheads (the per stall total if more than one head is present) must be  $\leq 7.50$  LPM (2.00 GPM);
- Average flow rate for all toilets, including dual-flush toilets, must be  $\leq 4.9$  LPF (1.30 GPF) AND meet the Uniform North American Requirements for toilet fixtures. That is, a toilet fixture should completely evacuate at least 350g of waste in a single flush action.

**OR****3.3 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:

- Average flow rate for all lavatory faucets must be  $\leq 5.60$  LPM (1.50 GPM);
- Average flow rate for all shower heads (the per stall total if more than one head is present) must be  $\leq 6.60$  LPM (1.75 GPM);
- Average flow rate for all toilets, including dual-flush toilets, must be  $\leq 4.10$  LPF (1.10 GPF) *and* meet the Uniform North American Requirements for toilet fixtures. That is, a toilet fixture should completely evacuate at least 350g of waste in a single flush action.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

**SYNERGIES AND TRADE-OFFS**

Indoor water savings can also be achieved with more efficient water distribution systems and appliances. Points for indoor water distribution-related savings are available under EA 7.1, and points for appliance-related water savings are available under EA 9.

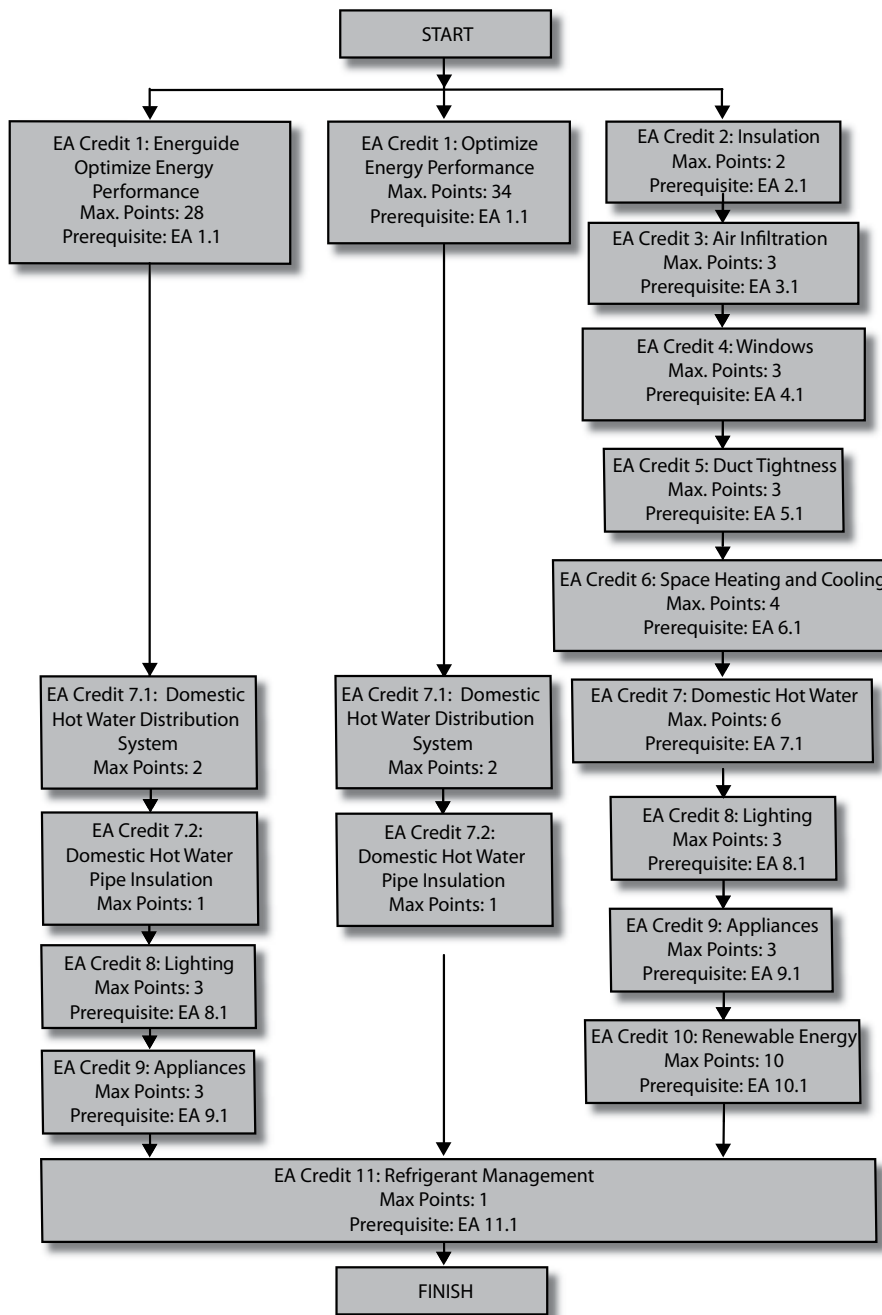
Low-flow showerheads and faucets will reduce demand for hot water and resulting energy use for water heating. Credits in EA 7 address water heating efficiency.

Note that care is needed to select low flow showerheads and diverter valves with pressure balancing capabilities to ensure that hot water scalding does not occur.



# ENERGY & ATMOSPHERE (EA)

## OPTIONAL PATHWAYS THROUGH THE EA CATEGORY



ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
1							

# ENERGY & ATMOSPHERE

## OPTIMIZE ENERGY PERFORMANCE

### INTENT

Improve the overall energy performance of a home by meeting or exceeding the performance of ERS (EnerGuide) 76 or HERS 80.

### REQUIREMENTS

#### PREREQUISITES

#### 1.1 Minimum Energy Performance ERS 76 or HERS 80.

#### CREDITS

#### 1.2 Exceptional Energy Performance in ERS (EnerGuide) (maximum 28 points).

Exceed the performance of ERS 76. Use table 15A below relating the EnerGuide Rating System (ERS) index to the appropriate number of LEED® points. This path can also pursue EA8 and EA9 and must meet the lighting prerequisite EA 8.1.

#### OR

#### Exceptional Energy Performance in HERS (maximum 34 points).

Exceed the performance of HERS 80. Use the table 15B below relating the Home Energy Standards (HERS) Index to the appropriate number of LEED® points.

TABLES 15A. ERS INDEX AND LEED® POINTS

ID	LL	SS	WE	EA	MR	EQ	AE
1							

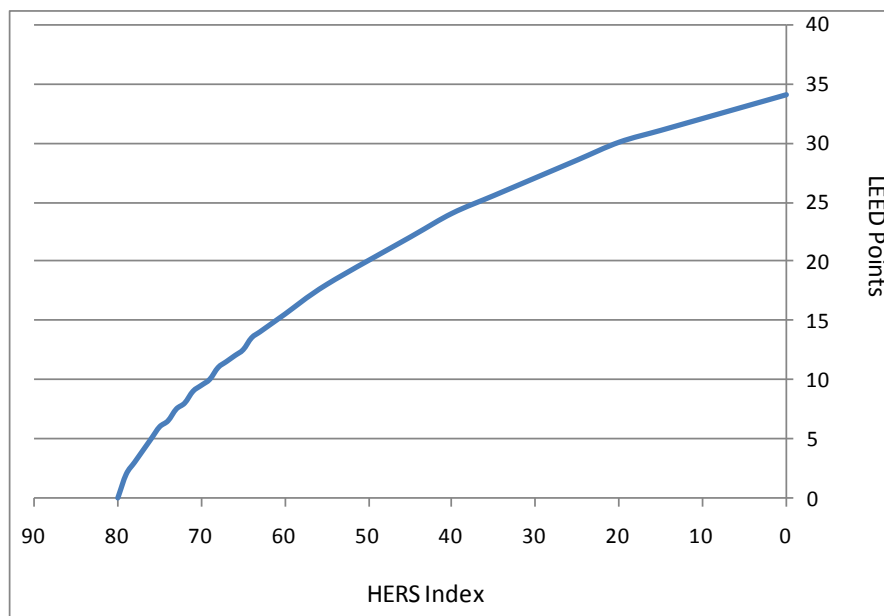
TABLE 15A ERS HOT 2000 10.3	
ERS	LEED® FOR HOMES
SCALE	POINTS
10	Ineligible
20	Ineligible
30	Ineligible
40	Ineligible
50	Ineligible
60	Ineligible
70	Ineligible
75	Ineligible
76	Prerequisite met
77	2
78	4
79	6
80	8
81	10
82	12
83	14
84	16
85	17
86	18
87	18.5
88	19
89	20
90	21
91	22
92	23
93	23.5
94	24
95	24.5
96	25
97	26
98	26.5
99	27
100	28

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>1</b>							

TABLES 15B. HERS INDEX AND LEED® POINTS

TABLE 15B HERS		
HERS	PERCENT ABOVE	LEED® FOR HOMES
SCALE	IECC 2004	POINTS
100	0	Ineligible
95	5	Ineligible
90	10	Ineligible
85	15	Ineligible
80	20	Prerequisite met
79	21	2
78	22	3
77	23	4
76	24	5
75	25	6
74	26	6.5
73	27	7.5
72	28	8
71	29	9
70	30	9.5
69	31	10
68	32	11
67	33	11.5
66	34	12
65	35	12.5
64	36	13.5
63	37	14
62	38	14.5
61	39	15
60	40	15.5
55	45	18
50	50	20
45	55	22
40	60	24
35	65	25.5
30	70	27
25	75	28.5
20	80	30
15	85	31
10	90	32
5	95	33
0	100	34

FIGURE 2. HERS INDEX VALUES AND LEED® POINTS



ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

## SYNERGIES AND TRADE-OFFS

A project receiving points for credit EA 1.2 (ERS/EnerGuide) must skip credits EA 2-6, 7.3, and 10.

A project receiving points for credit EA 1.2 (HERS) must skip credits EA 2-6, 7.3 and 8-10.

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

Shading and the reduction of local heat island effects (SS 3) can reduce energy demands for space cooling. Similarly, vegetated roofs (SS 4.3) can reduce both space heating and cooling loads.

High efficiency appliances and fixtures (WE 3) can reduce hot water demand.

Reduced framing (MR 1) can allow for more insulation and fewer thermal breaks.

Proper design and verification of space heating and cooling distribution systems (EQ 6) can help provide thermal comfort with minimized waste. In hot and humid climates, effective dehumidification (EQ 3) can significantly reduce cooling loads.

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
2							

# ENERGY & ATMOSPHERE

## INSULATION

### INTENT

Design and install insulation to minimize heat transfer and thermal bridging.

### REQUIREMENTS

#### PREREQUISITES

#### 2.1 Basic Insulation.

Meet all the following requirements:

- a. Install insulation that meets or exceeds the R-value requirements listed in Chapter 6 of the 2004 International Energy Conservation Code (Table 602.1) or the local building codes, whichever is more stringent. Alternative wall and insulation systems, such as structural insulated panels (SIPs) and insulated concrete forms (ICFs), must demonstrate a comparable R-value, but thermal mass or infiltration effects cannot be included in the R-value calculation.
- b. Install insulation to meet the provincial or local standards. Installation must be verified by a Green Rater conducting a pre-drywall thermal bypass inspection, as summarized in Figure 3.

#### CREDITS

#### 2.2 Enhanced Insulation (2 points).

Meet the following requirements:

- a. Install insulation that exceeds the R-value requirements listed in Chapter 6 of the 2004 International Energy Conservation Code (Table 602.1) or the local building code, whichever is more stringent, by at least 20%. Alternative wall and insulation systems, such as structural insulated panels (SIPs) and insulated concrete forms (ICFs), must demonstrate a comparable R-value, but thermal mass or infiltration effects cannot be included in the R-value calculation.
- b. Install insulation to meet grade I standards (Table 16). Installation must be verified by a Green Rater conducting a pre-drywall thermal bypass inspection, as summarized in Figure 3.

TABLE 16. SUMMARY OF HERS INSTALLATION GUIDES

	DESCRIPTION
1	Meet the requirements of Grade II (below), but allow only very small gaps, and compression or incomplete fill amounts to 2% or less.
2	Moderate to frequent installation defects, gaps around wiring, electric outlets, etc. and incomplete fill amounts to 10% or less. Gaps running clear through the insulation amount to no more than 2% of the total surface area covered by the insulation. Wall insulation is enclosed on all six sides and in substantial contact with the sheathing material on at least one side (interior or exterior) of the cavity.

ID	LL	SS	WE	EA	MR	EQ	AE
2							

Please refer to "Adopted Enhancements to the Mortgage Industry National Home Energy Rating Standards," available from RESNET, for a more detailed description.

### SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and all of the associated prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

MR 1.2–1.5 addresses framing efficiency. Efficient framing can create additional spacing in wall cavities, reducing thermal breaks and insulation compaction.

Environmentally preferable insulation is rewarded in MR 2.2.

FIGURE 3. ENERGY STAR THERMAL BYPASS INSPECTION CHECKLIST



## ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist

Home Address: _____		City: _____		State: _____	
Thermal Bypass	Inspection Guidelines	Corrections Needed	Builder Verified	Rater Verified	N/A
1. Overall Air Barrier and Thermal Barrier Alignment	<b>Requirements:</b> Insulation shall be installed in full contact with sealed interior and exterior air barrier except for alternate to interior air barrier under item no. 2 ( <i>Walls Adjoining Exterior Walls or Unconditioned Spaces</i> )				
	<b>All Climate Zones:</b>				
	1.1 Overall Alignment Throughout Home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.2 Garage Band Joist Air Barrier (at bays adjoining conditioned space)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.3 Attic Eave Baffles Where Vents/Leakage Exist	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Only at Climate Zones 4 and Higher:</b>				
	1.4 Slab-edge Insulation (A maximum of 25% of the slab edge may be uninsulated in Climate Zones 4 and 5.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Best Practices Encouraged, Not Req'd.:</b>					
	1.5 Air Barrier At All Band Joists (Climate Zones 4 and higher)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1.6 Minimize Thermal Bridging (e.g., OVE framing, SIPs, ICFs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Walls Adjoining Exterior Walls or Unconditioned Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>Fully insulated wall aligned with air barrier at both interior and exterior, <b>OR</b></li> <li>Alternate for <b>Climate Zones 1 thru 3</b>, sealed exterior air barrier aligned with RESNET Grade 1 insulation fully supported</li> <li>Continuous top and bottom plates or sealed blocking</li> </ul>				
	2.1 Wall Behind Shower/Tub	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.2 Wall Behind Fireplace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.3 Insulated Attic Slopes/Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.4 Attic Knee Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.5 Skylight Shaft Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.6 Wall Adjoining Porch Roof	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.7 Staircase Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	2.8 Double Walls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Floors between Conditioned and Exterior Spaces	<b>Requirements:</b> <ul style="list-style-type: none"> <li>Air barrier is installed at any exposed fibrous insulation edges</li> <li>Insulation is installed to maintain permanent contact with sub-floor above including necessary supports (e.g., staves for blankets, netting for blown-in)</li> <li>Blanket insulation is verified to have no gaps, voids or compression.</li> <li>Blown-in insulation is verified to have proper density with firm packing</li> </ul>				
	3.1 Insulated Floor Above Garage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3.2 Cantilevered Floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Shafts	<b>Requirements:</b> Openings to unconditioned space are fully sealed with solid blocking or flashing and any remaining gaps are sealed with caulk or foam (provide fire-rated collars and caulking where required)				
	4.1 Duct Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.2 Piping Shaft/Penetrations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	4.3 Flue Shaft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Attic/ Ceiling Interface	<b>Requirements:</b> <ul style="list-style-type: none"> <li>All attic penetrations and dropped ceilings include a full interior air barrier aligned with insulation with any gaps fully sealed with caulk, foam or tape</li> <li>Movable insulation fits snugly in opening and air barrier is fully gasketed</li> </ul>				
	5.1 Attic Access Panel (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.2 Attic Drop-down Stair (fully gasketed and insulated)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.3 Dropped Ceiling/Soffit (full air barrier aligned with insulation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.4 Recessed Lighting Fixtures (ICAT labeled and sealed to drywall)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5.5 Whole-house Fan (insulated cover gasketed to the opening)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Common Walls Between Dwelling Units	<b>Requirements:</b> Gap between drywall shaft wall (i.e., common wall) and the structural framing between units is fully sealed at all exterior boundary conditions				
	6.1 Common Wall Between Dwelling Units	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home Energy Rating Provider: _____ Rater Inspection Date: _____ Builder Inspection Date: _____					
Home Energy Rater Company Name: _____ Builder Company Name: _____					
Home Energy Rater Signature: _____ Builder Employee Signature: _____					

Posted 06/02/08

# ENERGY & ATMOSPHERE

## AIR FILTRATION

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

### INTENT

Minimize energy consumption caused by uncontrolled air leakage into and out of conditioned spaces.

### REQUIREMENTS

#### PREREQUISITES

#### **3.1 Reduced Envelope Leakage.**

Meet the air leakage requirements shown in Table 17. The air leakage rate must be tested and verified by a Green Rater.

#### CREDITS

#### **3.2 Greatly Reduced Envelope Leakage** (2 points).

Meet the air leakage requirements shown in Table 17. The air leakage rate must be tested and verified by a Green Rater.

#### **OR**

#### **3.3 Minimal Envelope Leakage** (3 points).

Meet the air leakage requirements shown in Table 17. The air leakage rate must be tested and verified by a Green Rater.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

TABLE 17. AIR LEAKAGE REQUIREMENTS

LEED® CRITERIA	PERFORMANCE REQUIREMENTS (IN ACH@50PA)		
	ZONE A (<3500 HDDS)	ZONE B (>3500 TO 5500 HDDS)	ZONE C AND D (>5500 TO 8000 HDDS)
EA 3.1: Reduced Envelope Leakage (mandatory)	3.5	3.0	2.5
EA 3.2: Greatly Reduced Envelope Leakage (optional)	3.0	2.5	2.0
EA 3.3: Minimal Envelope Leakage (optional)	2.5	2.0	1.5

See Figure 4 to identify the appropriate zone.

## SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Natural air leakage through the envelope contributes to the overall ventilation rate of the home. From a health perspective, it is important to not under ventilate a home. From an energy perspective, it is also important not to over ventilate. EQ 3 addresses the balance between mechanical and natural ventilation.

# ENERGY & ATMOSPHERE

## WINDOWS

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>4</b>							

### INTENT

Maximize the energy performance of windows.

### REQUIREMENTS

#### PREREQUISITES

##### 4.1 Good Windows.

Install ENERGY STAR certified windows according to the appropriate climate zone (see Figure 4), or of an equivalent Energy Rating (ER) level as determined by the CSA Standard A440.2.

#### CREDITS

##### 4.2 Enhanced Windows (2 points).

Design and install ENERGY STAR certified windows according to Table 18A or Table 18B, or of an equivalent Energy Rating (ER) level as determined by the CSA Standard A440.2.

OR

##### 4.3 Exceptional Windows (3 points).

Design and install ENERGY STAR certified windows according to Table 18A or Table 18B, or of an equivalent Energy Rating (ER) level as determined by the CSA Standard A440.2.

TABLE 18A. QUICK REFERENCE FOR WINDOWS

EA CREDIT	ZONE			
	A	B	C	D
EA 4.1: Good Windows (prerequisite)	A	B	C	D
EA 4.2: Enhanced Windows (optional, 2 points)	B	C	D	*
EA 4.3: Exceptional Windows (optional, 3 points)	C	D	*	*

\* see table B

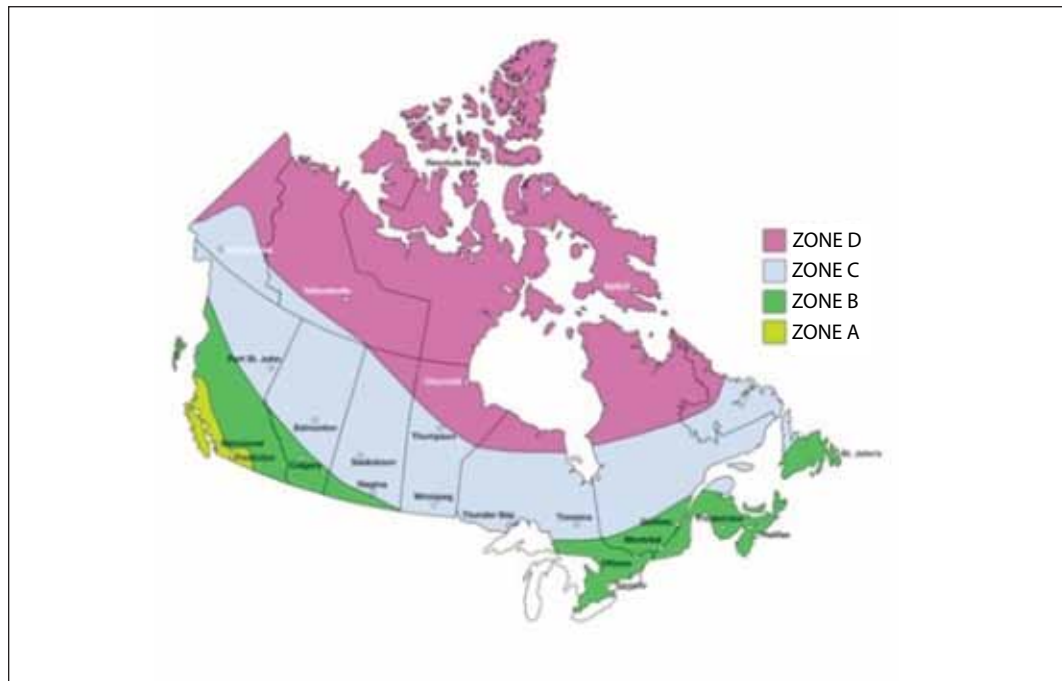
ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>4</b>							

TABLE 18B. ENERGY STAR REQUIREMENTS FOR WINDOWS AND GLASS DOORS (ER)

EA CREDIT	METRIC (W/M <sup>2</sup> ·K)	ZONE			
		A	B	C	D
EA 4.1: Good Windows (prerequisite)	ER	17	21	25	29
EA 4.2: Enhanced Windows (optional, 2 points)	ER	21	25	29	33
EA 4.3: Exceptional Windows (optional, 3 points)	ER	25	29	33	37

Note: ER is Energy Rating, based on the 2004 CSA standard.

FIGURE 4. ZONES FOR WINDOW SPECIFICATIONS



### SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Improving window performance may also reduce heating and/or cooling loads and the use of energy associated with operating heating and cooling equipment.

# ENERGY & ATMOSPHERE

## HEATING AND COOLING DISTRIBUTION SYSTEM

ID	LL	SS	WE	EA	MR	EQ	AE
5							

### INTENT

Minimize energy consumption due to thermal bridges and/or leaks in the heating and cooling distribution system.

### REQUIREMENTS

#### A. FORCED-AIR SYSTEMS

#### PREREQUISITES

##### 5.1 Reduced Distribution Losses.

Meet the following requirements:

- a. Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be  $\leq 0.11$  cmm (4.0 cfm) at 25 Pascals per 9.2 square metres (100 sq ft) of conditioned floor area (for each installed system), verified by the Green Rater. Testing is waived if no ducts are run outside the conditioned envelope or if the home meets EA 5.3 (b) or (c).
- b. Do not install ducts in exterior walls unless extra insulation is added to maintain the overall insulation level for an exterior wall without ducts. Ducts may be run inside interior wall cavities but must be fully ducted (i.e., do not use the wall cavity as the duct).
- c. Use at least RSI 1.06 (R-6) insulation around ducts in unconditioned spaces.

#### CREDITS

##### 5.2 Greatly Reduced Distribution Losses (2 points).

Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be  $\leq 0.08$  cmm (3.0 cfm) at 25 Pascals per 9.2 square metres (100 sq ft) of conditioned floor area (for each installed system), verified by the Green Rater.

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>5</b>							

**OR****5.3 Minimal Distribution Losses** (3 points).

Meet one of the following requirements:

- Limit duct air leakage to outside the conditioned envelope. The tested duct leakage rate must be  $\leq 0.03$  cmm (1.0 cfm) at 25 Pascals per 9.2 square metres (100 sq ft) of conditioned floor area, verified by the Green Rater.
- Locate the air-handler unit and all ductwork within the conditioned envelope and minimize envelope leakage (i.e., meet the requirements of EA 3.3).
- Locate the air-handler unit and all ductwork visibly within conditioned spaces (i.e., no ductwork hidden in walls, chases, floors, or ceilings).

B. NONDUCTED HVAC SYSTEMS (E.G., HYDRONIC SYSTEMS)

PREREQUISITES

**5.1 Reduced Distribution Losses.**

Use at least RSI-0.53 (R-3) insulation around distribution pipes in unconditioned spaces. For non-ducted heating units (e.g. PTACs) ensure no envelope air leakage around unit.

CREDITS

**5.2 Greatly Reduced Distribution Losses** (2 points).

Keep the system (including boiler and distribution pipes) entirely within the conditioned envelope.

**5.3 Minimal Distribution Losses** (1 point).

Install outdoor reset control (i.e., controls that modulate distribution water temperature based on outdoor air temperature).

**SYNERGIES AND TRADE-OFFS**

A project receiving points for EA 1.2 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

EQ 6 requires proper duct design to ensure adequate air flow and includes credit for testing air flow into each room.

MR Credits 1.2–1.5 address framing efficiency. HVAC and framing efficiency are closely linked; floor, ceiling, and roof framing layouts should be designed to use framing material efficiently and at the same time accommodate duct runs as efficiently as possible. Addressing both simultaneously provides an opportunity to achieve multiple resource efficiencies through one design exercise.

EQ Prerequisite 10.1 prohibits the placement of ductwork in the garage.

# ENERGY & ATMOSPHERE

## SPACE HEATING AND COOLING EQUIPMENT

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>6</b>							

### INTENT

Reduce energy consumption associated with the heating and cooling system.

### REQUIREMENTS

Note: Both the space heating and the space cooling equipment must meet the requirements of this credit. If only one type of equipment qualifies, then half the points should be taken. Homes built without air-conditioning should be modelled under EA 1, using the default (minimum efficiency allowed) in both the reference and the rated homes.

#### PREREQUISITES

#### **6.1 Good HVAC Design and Installation.**

Meet each of the following requirements:

- a. Design and size HVAC equipment properly using CAN/CSA-F280-M90 (R2004) "Determining the Required Capacity of Residential Space Heating and Cooling Appliances."
- b. Install ENERGY STAR rated HVAC equipment (Table 19).
- c. Install a programmable thermostat (except heat pumps and hydronic systems).

#### CREDITS

#### **6.2 High Efficiency HVAC** (2 points).

Design and install HVAC equipment that is equal to or exceeds the high efficiency standard in Table 19 as appropriate for the climate zone (reference Figure 4 map).

#### **OR**

#### **6.3 Very High Efficiency HVAC** (maximum 4 points).

Design and install HVAC equipment that is equal to or exceeds the high efficiency standard in Table 19 as appropriate for the climate zone (reference Figure 4 map). Any piping designed as part of a heat pump system to carry water that is well above (or below) the thermostatic temperature settings in the home must have RSI 0.70 (R-4) insulation or greater.

Note: The maximum of 4 points is available only if a heat pump is installed. Furnace and boiler systems can earn a maximum of 3 points.

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>6</b>							

## SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Substantial energy savings can be achieved by using heat recovery equipment. Heat or energy recovery systems are rewarded in EQ 4.2.

EQ Prerequisite 10.1 prohibits the placement of the air handler unit in the garage. EA 11 requires a refrigerant charge test and encourages the selection of preferred refrigerants.

TABLE 19A. HVAC REQUIREMENTS FOR CANADIAN CLIMATE ZONES A AND B

EA CREDIT	END USE	HVAC EQUIPMENT					
		CENTRAL AC AND AIR SOURCE HEAT PUMPS	FURNACES (GAS, OIL OR PROPANE)	BOILERS (GAS, OIL OR PROPANE)	GROUND-SOURCE HEAT PUMPS		
					OPEN LOOP	CLOSED LOOP	DIRECT EXPANSION
EA 6.1: Good HVAC Design and Installation (prerequisite)	Cooling	≥ 14 SEER			≥ 16.2 EER	≥ 14.1 EER	≥ 15 EER
	Heating	≥ 8.2 HSPF	≥ 90 AFUE	≥ 85 AFUE	≥ 3.6 COP	≥ 3.3 COP	≥ 3.5 COP
EA 6.2: High-Efficiency HVAC (2 points)	Cooling	≥ 15 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
	Heating	≥ 8.6 HSPF	≥ 92 AFUE	≥ 87 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
EA 6.3: Very High Efficiency HVAC (heat pump, 4 points; other systems, 3 points)	Cooling	≥ 16 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
	Heating	≥ 9.0 HSPF	≥ 94 AFUE*	≥ 89 AFUE	≥ 4.3 COP	≥ 4.0 COP	

\* Furnace with low electric energy use.

TABLE 19B. HVAC REQUIREMENTS FOR CANADIAN CLIMATE ZONES C AND D

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
<b>6</b>							

EA CREDIT	END USE	HVAC EQUIPMENT					
		CENTRAL AC AND AIR SOURCE HEAT PUMPS	FURNACES (GAS, OIL OR PROPANE)	BOILERS (GAS, OIL OR PROPANE)	GROUND-SOURCE HEAT PUMPS		
					OPEN LOOP	CLOSED LOOP	DIRECT EXPANSION
EA 6.1: Good HVAC Design and Installation (prerequisite)	Cooling	≥ 13 SEER			≥ 16.2 EER	≥ 14.1 EER	≥ 15 EER
	Heating	≥ 8.2 HSPF	≥ 92 AFUE	≥ 87 AFUE	≥ 3.6 COP	≥ 3.3 COP	≥ 3.5 COP
EA 6.2: High-Efficiency HVAC (2 points)	Cooling	≥ 14 SEER			≥ 17.8 EER	≥ 15.5 EER	≥ 16.5 EER
	Heating	≥ 8.6 HSPF	≥ 94 AFUE	≥ 89 AFUE	≥ 4.0 COP	≥ 3.6 COP	≥ 3.9 COP
EA 6.3: Very High Efficiency HVAC (heat pump, 4 points; other systems, 3 points)	Cooling	≥ 15 SEER			≥ 19.4 EER	≥ 17 EER	≥ 18 EER
	Heating	≥ 9.0 HSPF	≥ 96 AFUE*	≥ 91 AFUE	≥ 4.3 COP	≥ 4.0 COP	≥ 4.2 COP

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
7							

# ENERGY & ATMOSPHERE

## WATER HEATING

### INTENT

Reduce energy consumption associated with the domestic hot-water system, including improving the efficiency of both the hot water system design and the layout of the fixtures in the home.

### REQUIREMENTS

#### PREREQUISITES:

None.

#### CREDITS

#### **7.1 Efficient Hot-Water Distribution** (2 points).

Design and install an energy-efficient hot-water distribution system (see Figure 5). None of the branch length requirements below apply to cold-water demand loads (e.g., toilets), washing machines, or tubs without showerheads. Select one of the following designs:

- a. Structured plumbing system. The system must meet all of the following:
  - i. The system must have a demand-controlled circulation loop that is insulated to at least RSI-0.70 (R-4).
  - ii. The total length of the circulation loop must be less than 12.2 linear metres (40 ft) of plumbing in one-storey homes. Add 2x the ceiling height for two-storey homes, and add 4x the ceiling height for three- or four-storey homes.
  - iii. Branch lines from the loop to each fixture must be  $\leq 3$  m (10 ft) long and a maximum of 13 mm ( $\frac{1}{2}$  inch) nominal diameter.
  - iv. The system must be designed with a push-button control in each full bathroom and the kitchen, and an automatic pump shut-off.
- b. Central manifold distribution system. The system must meet all of the following:
  - i. The central manifold trunk must be no more than 1.8 m (6 ft) in length.
  - ii. The central manifold trunk must be insulated to at least RSI-0.70 (R-4).
  - iii. No branch line from the central manifold to any fixtures may exceed 6 m (20 ft) in one-storey homes. Add 1x the ceiling height for two-storey homes, and add 2x the ceiling height for three- or four-storey homes.
  - iv. Branch lines from the manifold must be a maximum of 13 mm ( $\frac{1}{2}$  inch) nominal diameter.

- c. Compact design of conventional system. The system must meet all of the following:
- No branch line from the water heater to any fixtures may exceed 6 m (20 ft) in one-storey homes. Add 1x the ceiling height for two-storey homes, and add 2x the ceiling height for three- or four-storey homes.
  - Branch lines from the central heater to each fixture must be a maximum of 13 mm (½ inch) nominal diameter.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>7</b>							

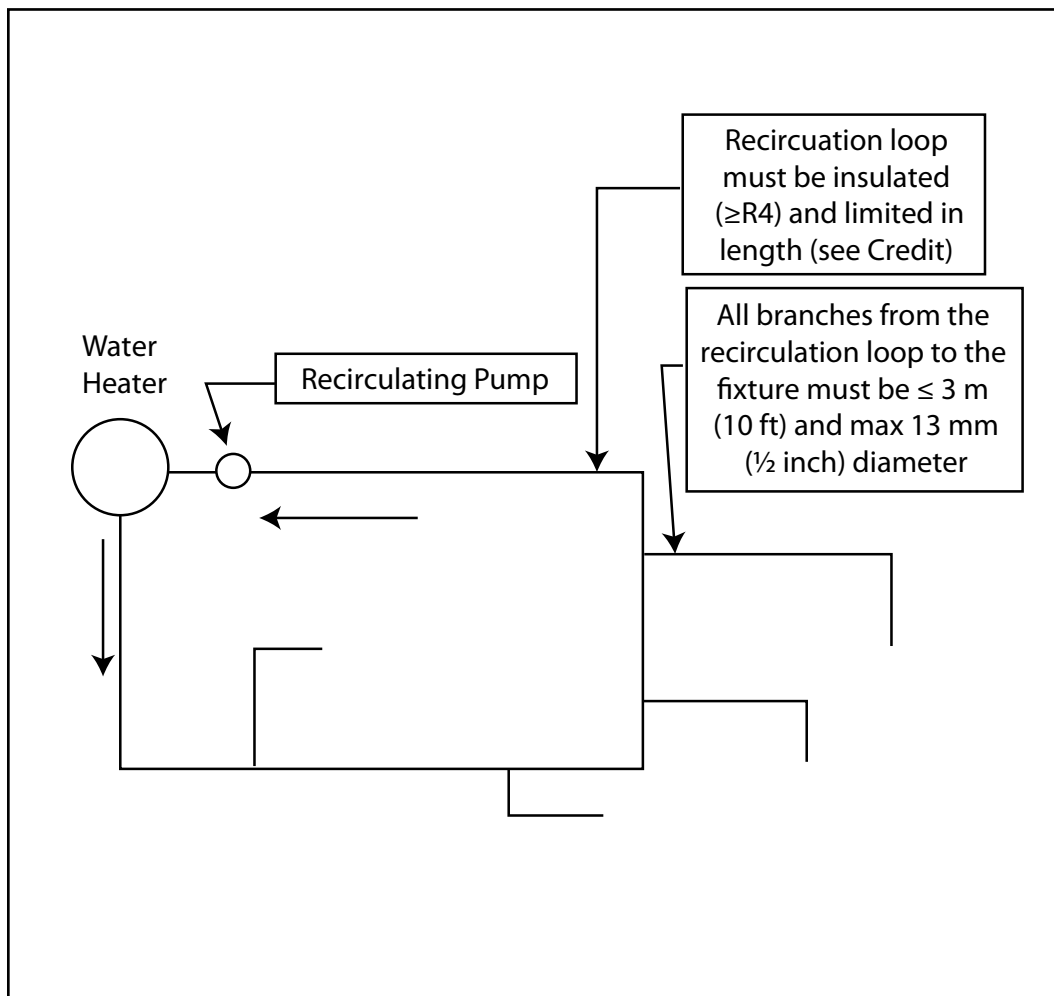
### 7.2 Pipe Insulation (1 point).

All domestic hot water piping shall have RSI-0.7 (R-4) insulation. Insulation shall be properly installed on all piping elbows to adequately insulate the 90-degree bend.

### 7.3 Efficient Domestic Hot Water (DHW) Equipment (maximum 3 points).

Design and install energy efficient water heating equipment. If solar hot water is used, refer to the *CAN/CSA-F383-87 Installation Code for Solar Domestic Hot Water Systems*. Select one or more measures from Table 20 below.

FIGURE 5A. SAMPLE SCHEMATIC OF A STRUCTURED PLUMBING SYSTEM



ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
7							

FIGURE 5B. SAMPLE SCHEMATIC OF A CENTRAL MANIFOLD DISTRIBUTION SYSTEM

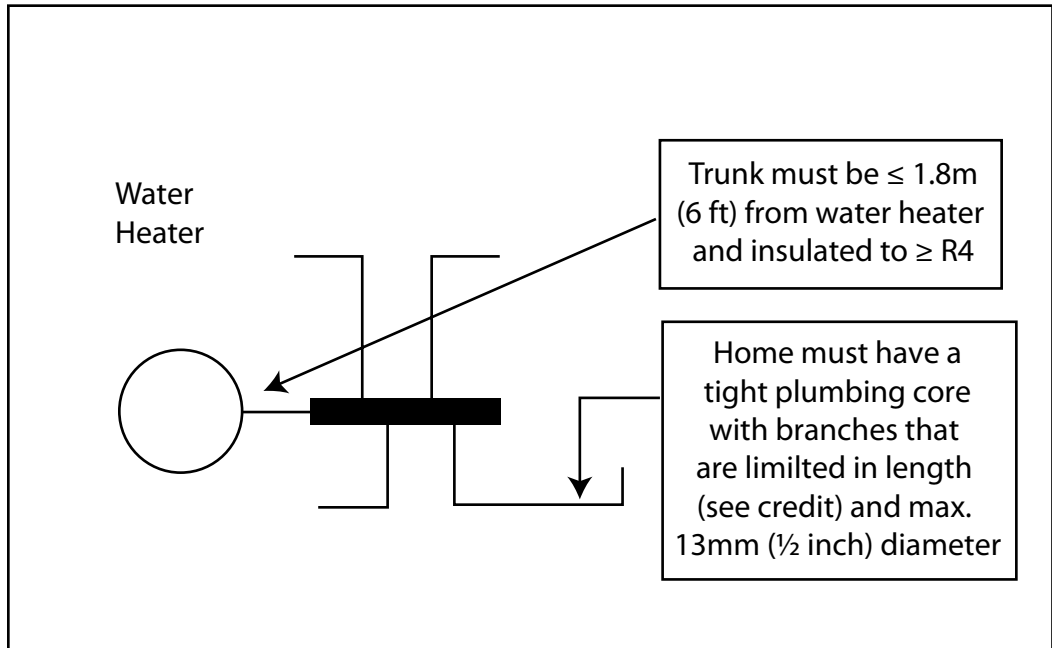


FIGURE 5C. SAMPLE SCHEMATIC OF A COMPACT DESIGN

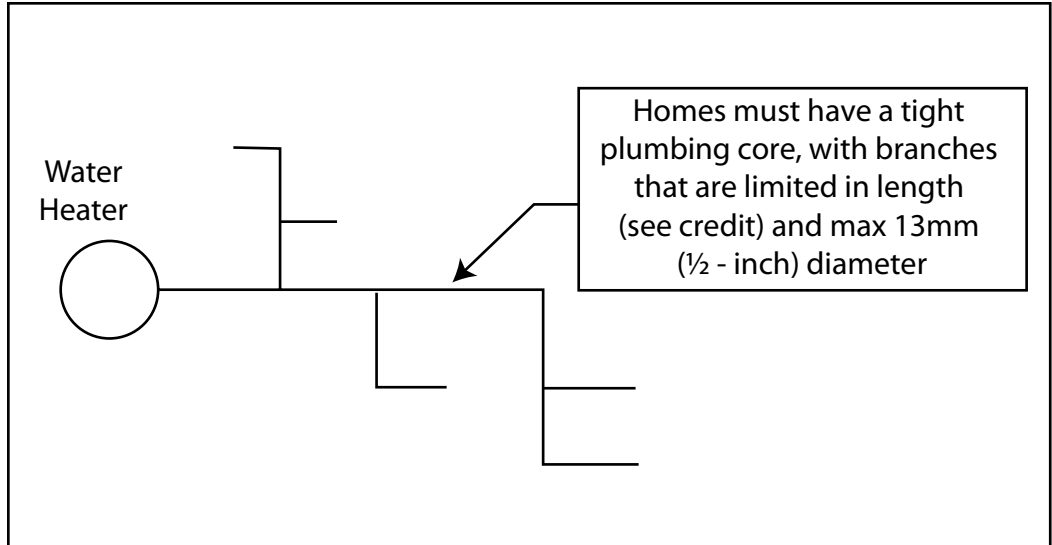


TABLE 20. HIGH-EFFICIENCY WATER HEATING EQUIPMENT\*

WATER HEATER TYPE AND EFFICIENCY REQUIREMENT	DESCRIPTION	POINTS
<b>Gas water heaters</b>		
EF ≥ 0.53 (300 litres / 80 gallons)	High-efficiency storage water heater	1
EF ≥ 0.57 (230 litres / 60 gallons)	High-efficiency storage water heater	1
EF ≥ 0.61 (150 litres / 40 gallons)	High-efficiency storage water heater	1
EF ≥ 0.8	Storage or tank less water heater	2
CAE ≥ 0.8	Combination water and space heaters	2
<b>Electric water heaters</b>		
EF ≥ 0.89 (300 litres / 80 gallons)	High-efficiency storage water heater	1
EF ≥ 0.92 (190 litres / 50 gallons)	High-efficiency storage water heater	1
EF ≥ 0.93 (150 litres / 40 gallons)	High-efficiency storage water heater	1
EF ≥ 0.99	Tank less water heater	2
EF ≥ 2.0	Heat pump water heater (ground- or air-sourced)	3
<b>Solar water heaters</b>		
≥ 40% of annual DHW load	With preheat tank	2
≥ 60% of annual DHW load	With preheat tank	3
Drain water heat recovery: Install a heat exchanger that captures waste heat from drain water and pre-heats domestic hot water.		1

\*Note: A total of 3 points are possible from this section.

EF = Energy factor. Energy factors for equipment from various manufacturers are available at: <http://www.gamanet.org/gama/inforesources.nsf/vContentEntries/Product+Directories>

CAE = Combined annual efficiency.

## SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for EA 7.3, and vice versa. A project pursuing EA 7.3 must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section. EA 7.1 and 7.2 are available to every project, whether the performance approach (EA 1) or the prescriptive approach (EA 2–10) is taken.

Low-flow showerheads and faucets may also reduce demand for hot water and resulting energy use for water heating. Points for installing low-flow showerheads are available under WE 3. Additional reductions in hot water energy use achieved through efficient appliances are addressed in EA 9.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>7</b>							

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
8							

# ENERGY & ATMOSPHERE

## LIGHTING

### INTENT

Reduce energy consumption associated with interior and exterior lighting.

### REQUIREMENTS

#### PREREQUISITES

#### **8.1 ENERGY STAR Lights.**

Install at least four ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs (CFLs) in high-use rooms (kitchen, dining room, living room, family room, hallways).

#### CREDITS

#### **8.2 Improved Lighting** (1.5 maximum points).

Select and install one or both of the following measures:

- a. Interior lighting (0.5 point). Install three additional ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs (CFLs) in high use rooms. These are in addition to the four ENERGY STAR lights required by EA 8.1.
- b. Exterior lighting (1 point). All exterior lighting must have either motion sensor controls or integrated solar electric cells. The following lighting is exempt: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances or exits.

#### **OR**

#### **8.3 Advanced Lighting Package** (3 points).

Install ENERGY STAR Advanced Lighting Package using only ENERGY STAR labeled fixtures. The Advanced Lighting Package consists of a minimum of 60% ENERGY STAR qualified hard wired fixtures and 100% ENERGY STAR qualified ceiling fans (if any).

#### **OR**

Install ENERGY STAR labeled lamps in 80% of the fixtures throughout the home. ENERGY STAR labeled CFLs are acceptable. All ceiling fans must be ENERGY STAR labeled.

## SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 HERS path is not eligible for this credit, and vice versa. A project following path EA1 ERS (EnerGuide) path is required to meet the prerequisite in this credit and can pursue its points. A project pursuing this credit must follow the prescriptive pathway and meet all the associated prerequisites in EA 2-10. Prerequisites EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

Improving the lighting efficiency may also reduce cooling loads and the energy consumption associated with air-conditioning.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>8</b>							

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
9							

# ENERGY & ATMOSPHERE

## APPLIANCES

### INTENT

Reduce appliance energy consumption.

### REQUIREMENTS

#### PREREQUISITES

None

#### CREDITS

#### **9.1 High Efficiency Appliances** (maximum 2 points).

Install appliances from the list below. To receive points for one type (e.g., refrigerator), every appliance of that type must meet the applicable requirement below:

- a. ENERGY STAR labeled refrigerator(s) (1 point).
- b. ENERGY STAR labeled dishwasher(s) that use 6.0 gallons or less per cycle (0.5 points).
- c. ENERGY STAR labeled clothes washer(s) (0.5 points).

#### **9.2 Water Efficient Clothes Washer** (1 point).

Install clothes washer with modified energy factor (MEF)  $\geq 2.0$  and water factor (WF)  $< 5.5$ . A clothes washer that meets these requirements and the requirement in EA 9.1 can be counted for both.

### SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 HERS path is not eligible for this credit, and vice versa. A project following path EA1 ERS (EnerGuide) path is required to meet the prerequisite in this credit and can pursue its points. A project pursuing this credit must follow the prescriptive pathway and meet all the associated prerequisites in EA 2-10. Prerequisite EA 1.1 should be skipped only if following the prescriptive path. See the pathway schematic at the beginning of the EA section.

# ENERGY & ATMOSPHERE

## RENEWABLE ENERGY

ID	LL	SS	WE	EA	MR	EQ	AE
<b>10</b>							

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **10.1 Renewable Energy System** (maximum 10 points).

Design and install a renewable electricity generation system. Use energy modelling to estimate both the energy supplied by the renewable energy system and the annual reference electrical load. Receive 1 point for every 3% of the annual reference electrical load met by the system.

Annual reference electric load is calculated using the HERS Reference Home or for an average size home the Energuide reference electrical load can be used.

For example,

Annual electricity consumption in reference home = 7,000 KWh

Annual electricity supplied by renewable energy system = 2,000 KWh

Percentage of annual reference electric load supplied  
by renewable energy system =  $2,000 / 7,000$

= 30.0%

LEED® points, under EA 10 = 10 points

### SYNERGIES AND TRADE-OFFS

A project receiving points for EA 1 is not eligible for this credit, and vice versa. A project pursuing this credit must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section.

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

Solar hot water heating systems are rewarded in EA 7.3.

ID	LL	SS	WE	<b>EA</b>	MR	EQ	AE
11							

# ENERGY & ATMOSPHERE

## RESIDENTIAL REFRIGERANT MANAGEMENT

### INTENT

Select and test air-conditioning refrigerant to ensure performance and minimize contributions to ozone depletion and global warming.

### REQUIREMENTS

#### PREREQUISITES

#### 11.1 Refrigerant Charge Test.

Provide proof of proper refrigerant charge of the air-conditioning system (unless home has no refrigerants in the cooling system).

#### CREDITS

#### 11.2 Appropriate HVAC Refrigerants (1 point).

Meet one of the following:

- a. No refrigerants required due to passive cooling design.
- b. Install an HVAC system with a non-HCFC refrigerant (e.g., R-410a).
- c. Install an HVAC system with a refrigerant that complies with the following equation. (See Table 21 for examples of the equation applied to R410a used in different system sizes).

$LCGWP + LCODP \times 10^5 \leq 80$  (metric) or 160 imperial where :

$LCODP = [ODPr \times (Lr \times Life + Mr) \times Rc] / Life$

$LCGWP = [GWPr \times (Lr \times Life + Mr) \times Rc] / Life$

LCODP = Lifecycle Ozone Depletion Potential (kg CFC11/tonne-year)

LCGWP = Lifecycle Direct Global Warming Potential (kg CO<sub>2</sub>/tonne-year)

GWPr = Global Warming Potential of Refrigerant (0–1,000 kg CO<sub>2</sub>/kgr)

ODPr = Ozone Depletion Potential of Refrigerant (0–0.2 kg CFC11/kgr)

Lr = Refrigerant Leakage Rate (0.5–2.0%; default of 2% unless otherwise demonstrated)

Mr = End-of-life Refrigerant Loss (2.0–10%; default of 10% unless otherwise demonstrated)

Rc = Refrigerant Charge (0.23–2.26 kgs of refrigerant per tonne of cooling capacity)

Life = Equipment Life (10–35 years; default based on equipment type, unless otherwise demonstrated)

TABLE 21. EXAMPLES OF RESIDENTIAL REFRIGERANTS ELIGIBLE FOR EA 11.2

REFRIGERANT	COMBINED LCGWP+ LCODP SCORE	SYSTEM SIZE	REFRIGERANT CHARGE	LEAKAGE RATE	EQUIPMENT LIFE
R410a	152	1.8 tonnes (2 tons)	1.71 kg/tonne (3.7 lb/ton)	1.5%	15 years
R410a	151	2.7 tonnes (3 tons)	1.26 kg/tonne (3.0 lb/ton)	2.0%	15 years
R410a	151	3.6 tonnes (4 tons)	1.26 kg/tonne (3.0 lb/ton)	2.0%	15 years
R410a	121	4.5 tonnes (5 tons)	1.26 kg/tonne (3.0 lb/ton)	2.0%	15 years

$$\text{LCGWP} = [\text{GWPr} \times (\text{Lr} \times \text{Life} + \text{Mr}) \times \text{Rc}] / \text{Life}$$

ID	LL	SS	WE	EA	MR	EQ	AE
<b>11</b>							

## SYNERGIES AND TRADE-OFFS

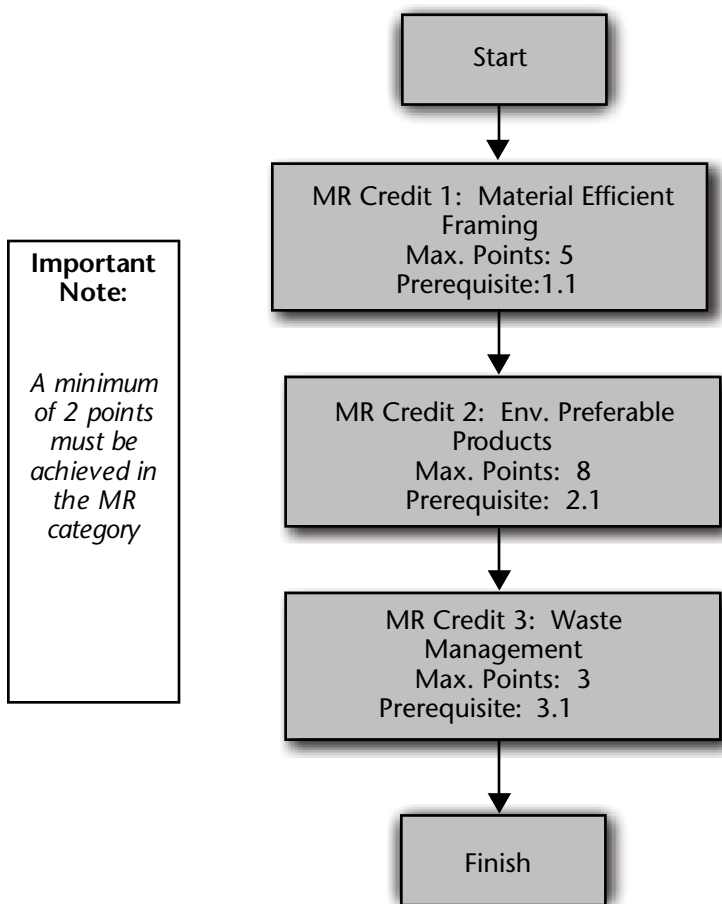
Efficient air-conditioning systems are covered under EA 6.

This credit is available to every project, whether the performance approach (EA 1) or the prescriptive approach (EA 2–10) is used.



# MATERIALS AND RESOURCES (MR)

## PATHWAY THROUGH THE MR CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# MATERIALS & RESOURCES

## MATERIAL EFFICIENT FRAMING

### INTENT

Optimize the use of framing materials.

### REQUIREMENTS

#### PREREQUISITES

#### 1.1 Framing Order Waste Factor Limit.

Limit the overall estimated waste factor to 10% or less. If the waste factor on any portion of the framing order exceeds 10%, calculate the overall waste factor as shown in Table 22.

*Waste factor* is defined as the percentage of framing material ordered in excess of the estimated material needed for construction.

TABLE 22. SAMPLE FRAMING ORDER WASTE FACTOR CALCULATION

FRAMING COMPONENT	TOTAL COST	WASTE FACTOR	WASTE COST
Random lengths	\$1,000	15%	\$150
Studs	\$2,000	5%	\$100
Beams and headers	\$500	20%	\$100
Roof deck	\$2,000	0%	\$0
Wall sheathing	\$0	0%	\$0
Rafters	\$2,000	0%	\$0
Ceiling joists	\$1,500	10%	\$150
Cornice work	\$3,000	10%	\$300
TOTAL	\$12,000		\$800
Overall waste factor (waste \$ / cost \$)			6.6%

CREDITS

ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

**1.2 Detailed Framing Documents** (1 point).

Prior to construction, create detailed framing plans or scopes of work and accompanying architectural details for use on the job site. Indicate the specific locations, spacing, and sizes of all framing members in the floors, walls, roof, and ceiling (if different from the roof).

**1.3 Detailed Cut List and Lumber Order** (1 point).

The requirements in MR 1.2 must be met to earn this credit. Prior to construction, create a detailed cut list and lumber order that corresponds directly to the framing plans and/or scopes of work.

**AND/OR**

**1.4 Framing Efficiencies** (maximum 3 points).

Implement measures from Table 23.

**OR**

**1.5 Off-Site Fabrication** (4 points).

Use either of the following alternatives to on-site framing:

- a. Panelized construction. Wall, roof, and floor components are delivered to the job site preframed.
- b. Modular, prefabricated construction. All principal building sections are delivered to the job site as prefabricated modules.

TABLE 23. EFFICIENT FRAMING MEASURES

MEASURE	POINTS
Precut framing packages	1.0
Open-web floor trusses	1.0
Structural insulated panel (SIP) walls	1.0
SIP roof	1.0
SIP floors	1.0
Stud spacing greater than 400 mm (16 inches) o.c.	1.0
Ceiling joist spacing greater than 400 mm (16 inches) o.c.	0.5
Finger-jointed framing materials	0.5
Floor joist spacing greater than 400 mm (16 inches) o.c.	0.5
Roof rafter spacing greater than 400 mm (16 inches) o.c.	0.5
Implement any 2 of the following: Size headers for actual loads Use ladder blocking or drywall clips Use 2-stud corners	0.5

ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

Note: Alternative measures not listed in Table 23 may be eligible to earn points if they save comparable amounts of framing material. A formal credit interpretation request with full justification of any alternative measure's potential savings must be submitted by the Provider to CaGBC.

## SYNERGIES AND TRADE-OFFS

Reduced framing can reduce the number and size of thermal breaks and increase the amount of insulation installed, leading to better energy performance (EA 1 and 2).

Credit MR 1.2 is a prerequisite for MR 1.3. A home that earns points for MR 1.2, 1.3 and 1.4 cannot earn points for MR 1.5, and vice versa.

Optimizing the use of framing will reduce the amount of construction waste (MR 3.2).

# MATERIALS & RESOURCES

## ENVIRONMENTALLY PREFERABLE PRODUCTS

ID	LL	SS	WE	EA	MR	EQ	AE
2							

### INTENT

Increase demand for environmentally preferable products and products or building components that are extracted, processed, and manufactured within the region.

### REQUIREMENTS

#### PREREQUISITES

#### 2.1 FSC-Certified Tropical Wood.

Meet the following two requirements, as applicable:

- a. Provide all wood-product suppliers with a notice (see Figure 6, below) containing all the following elements:
  - i. a statement that the builder's preference is to purchase products containing tropical wood only if it is FSC-certified;
  - ii. a request for the country of manufacture of each product supplied; *and*
  - iii. a request for a list of FSC-certified tropical wood products the vendor can supply.

FIGURE 6. EXAMPLE NOTICE TO WOOD PRODUCTS SUPPLIERS

Notice to Vendors: [The company] is required to purchase products that contain tropical wood only if they are certified according to the guidelines of the Forest Stewardship Council (FSC). Please provide the country of manufacture of each product you expect to supply to us. Also please provide a list of FSC-certified products you can supply.

- b. If tropical wood is intentionally used (i.e., specified in purchasing documents), use only FSC-certified tropical wood products. Reused or reclaimed materials are exempt.

Note: A species of wood is considered *tropical* for the purposes of this prerequisite if it is grown in a country that lies between the Tropics of Cancer and Capricorn.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## CREDITS

**2.2 Environmentally Preferable Products** (0.5 point each, maximum 8 points).

Use building component materials that meet one or more of the criteria below. Except as noted in Table 24, a material must make up 90% of the component, by weight or volume. A single component that meets each criterion (i.e., environmentally preferable, low emissions, and local sourcing) can earn points for each.

- a. Environmentally preferable products (0.5 point per component) that reduce environmental impact external to the house site (EPP Specification), or internal to the house (Emission Specification). Product specifications, including EPP and Emission Specifications, are listed in Table 24.

Note: Recycled content products must contain a minimum of 25% postconsumer recycled content, except as noted in Table 24. Post-industrial (preconsumer) recycled content must be counted at half the rate of postconsumer content.

**AND/OR**

- b. Low emissions (0.5 point per component). Use products that meet the emissions specifications in Table 24.

**AND/OR**

- c. Local production (0.5 point per component). Use products that were extracted, processed, *and* manufactured within 800 km (500 miles) of the home if moved by truck or within 2400 km (1500 miles) if moved by rail.

For each category shown in Table 24, earn 0.5 point (maximum for all products under each category) for each of the three criteria type met (EPP Specifications, Emission Specifications, and/or "local"). Except as noted otherwise below, 90% of the component, as defined in each category, must meet the specification shown.

TABLE 24. ENVIRONMENTALLY PREFERABLE PRODUCTS

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

ASSEMBLY	COMPONENT	EPP SPECIFICATIONS (0.5 POINTS PER COMPONENT)	EPP SPECIFICATIONS (0.5 POINTS PER COMPONENT)	LOCAL PRODUCTION (0.5 POINTS PER COMPONENT)
Exterior wall	Framing/wall structure	Concrete wall structure: use 30% supplemental cementitious material Wood frame: FSC-certified or reclaimed or finger joint studs	N/A	Eligible
Exterior wall	Siding or masonry	Recycled content, reclaimed, or FSC-certified	N/A	Eligible
Floor	Flooring (45% of total floor area)	Linoleum, cork, bamboo, FSC-certified or reclaimed wood, sealed concrete, recycled-content flooring, or combination	Carpet & pad: all carpet and pad complies with Carpet & Rug Institute Green Label Plus program Hard flooring: automatic 0.5 point for 90% hard surface flooring Hard flooring: additional 0.5 point for using a product that is SCS FloorScore-certified	Eligible
Floor	Flooring (90% of total floor area)	Meet specifications above to receive additional 0.5 point		Eligible (additional 0.5 points)
Floor	Framing	FSC-certified or reclaimed	N/A	Eligible
Foundation	Cement	Use 30% supplemental cementitious material	N/A	Eligible
Foundation	Cement	Use 50% supplemental cementitious material (receive an additional 0.5 point)	N/A	Eligible
Interior wall	Framing	FSC-certified or reclaimed	N/A	Eligible
Interior wall and ceilings	Gypsum board	N/A	N/A	Eligible
Interior wall and ceilings	Paints and coatings	Recycled paint that meets Green Seal standard GS-43	Use products that comply with all applicable standards in Table 25	N/A
Landscape	Decking or patio material	Recycled content, FSC-certified or reclaimed	N/A	Eligible
Other	Cabinets	Recycled content, FSC-certified or reclaimed and composite materials must contain no added urea-formaldehyde resins	N/A	N/A

ID	LL	SS	WE	EA	MR	EQ	AE
2							

TABLE 24. ENVIRONMENTALLY PREFERABLE PRODUCTS (CONTINUED)

ASSEMBLY	COMPONENT	EPP SPECIFICATIONS (0.5 POINTS PER COMPONENT)	EPP SPECIFICATIONS (0.5 POINTS PER COMPONENT)	LOCAL PRODUCTION (0.5 POINTS PER COMPONENT)
Other	Counters (kitchens and bathrooms)	Recycled content, FSC-certified or reclaimed and composite materials must contain no added urea-formaldehyde resins	N/A	Eligible
Other	Doors (not including garage or insulated doors) and trim	Recycled content, FSC-certified or reclaimed and composite materials must contain no added urea-formaldehyde resins	N/A	Eligible
Other	Adhesives and sealant	N/A	Use products that comply with all applicable standards in Table 25	Eligible
Roof	Framing	FSC-certified	N/A	Eligible
Roof	Roofing	Recycled content	N/A	Eligible
Roof and floor and wall	Cavity Insulation (i.e. Not rigid foam insulation)	Recycled content of 20% or more	Comply with California "Practice for Testing of VOCs from Building Materials Using Small Chambers" ( <a href="http://www.dhs.ca.gov/ehlb/IAQ/VOCS/Practice.htm">www.dhs.ca.gov/ehlb/IAQ/VOCS/Practice.htm</a> )	Eligible
Roof, floor, wall (2 of 3)	Sheathing	Recycled content, FSC-certified or reclaimed	N/A	Eligible

TABLE 25. STANDARDS FOR ENVIRONMENTALLY PREFERABLE PAINTS AND COATINGS

TYPES OF PAINTS AND COATINGS	APPLICABLE STANDARD (VOC CONTENT)	REFERENCE
Architectural paints, coatings and primers applied to interior elements	Flats: 50 g/L Nonflats: 150 g/L	Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993
Anticorrosive and antirust paints applied to interior ferrous metal substrates	250 g/L	Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997
Clear wood finishes	Varnish: 350 g/L Lacquer: 550 g/L	South Coast Air Quality Management District Rule 1113, Architectural Coatings
Floor coatings	100 g/L	
Sealers	Waterproofing: 250 g/L Sanding: 275 g/L All others: 200 g/L	
Shellacs	Clear: 730 g/L Pigmented: 550 g/L	
Stains	250 g/L	

TABLE 26. STANDARDS FOR LOW-EMISSIONS ADHESIVES AND SEALANTS  
(meet South Coast Air Quality Management District Rule #1168)

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

PRODUCT	APPLICABLE STANDARD (VOC CONTENT, G/L LESS WATER)
<b>ARCHITECTURAL APPLICATIONS</b>	
Indoor carpet adhesives	50
Carpet pad adhesives	50
Wood flooring adhesives	100
Rubber floor adhesives	60
Subfloor adhesives	50
VCT and asphalt adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Ceramic tile adhesive	65
<b>SPECIALTY APPLICATIONS</b>	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special-purpose contact adhesive	250
Structural wood member adhesive	140
Sheet-applied rubber lining operations	850
Top and trim adhesive	250
<b>SUBSTRATE-SPECIFIC APPLICATIONS</b>	
Metal to metal	30
Plastic foams	50
Porous materials (except wood)	50
Wood	30
Fiberglass	80
<b>SEALANTS</b>	
Architectural	250
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
<b>SEALANT PRIMERS</b>	
Architectural nonporous	250
Architectural porous	775
Other	750

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## SYNERGIES AND TRADE-OFFS

Products with low emissions of volatile organic compounds (VOCs) may improve indoor air quality. Such products are included in this credit rather than in the EQ section in order to consolidate information pertaining to materials selection, specification, and purchase.

A substantial amount of energy is used to transport materials from product manufacturing plants to home construction sites. Choosing local products will reduce the embedded transportation energy usage associated with construction.

# MATERIALS & RESOURCES

## WASTE MANAGEMENT

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

### INTENT

Reduce waste generation to a level below the industry norm.

### REQUIREMENTS

#### PREREQUISITES

#### **3.1 Construction Waste Management Planning.**

Complete the following tasks related to management of construction waste:

- a. Investigate and document local options for diversion (e.g. recycling, reuse) of all anticipated major constituents of the project waste stream, including cardboard packaging and household recyclables (e.g., beverage containers).
- b. Document the diversion rate for construction waste. Record the diversion rate for land clearing and/or demolition, if applicable (e.g., on gut rehab project), separately from the rate for the new construction phase of the project.

#### CREDITS

#### **3.2 Construction Waste Reduction** (maximum 3 points).

Reduce or divert waste generated from new construction activities from landfills and incinerators to a level below the industry norm. Use either of two options:

- a. Reduced construction waste. Calculate the weight OR volume of waste generated and divide that by the building floor area of the project. Use column 1,2, and 5 of table 27 a (metric units) or 27 b (imperial units) to determine your points.<sup>1</sup>
- b. Increased waste diversion. Divert 25% or more of the total materials taken off the construction site from landfills and incinerators. Use column 3 or 4 and column 5 of Table 27 to determine the score; calculate the percentage using either weight or volume.

Note: Land clearing and demolition waste (e.g., from removal of preexisting structures on the site) should not be counted in this calculation.

<sup>1</sup>The industry average is 20 kg or 0.02 cubic metres of waste per square metre (4.2 pounds or 0.0265 cubic yards of waste per square foot) of conditioned floor area, based on data provided by the National Association of Home Builders' Research Center.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

TABLE 27A. WASTE DIVERSION (METRIC UNITS)

AMOUNT TO LANDFILLS AND INCINERATORS				POINTS
REDUCED CONSTRUCTION WASTE		INCREASED WASTE DIVERSION		
KG / M <sup>2</sup>	CUBIC METRE / 100 M <sup>2</sup>	PERCENTAGE WASTE	PERCENTAGE DIVERTED	
44	21	100%	0%	0.0
39	18	87.5%	12.5%	0.0
33	16	75%	25%	0.5
28	13	62.5%	37.5%	1.0
22	10	50%	50%	1.5
17	8	37.5%	62.5%	2.0
11	5	25%	75%	2.5
6	3	12.5%	87.5%	3.0

TABLE 27B. WASTE DIVERSION (IMPERIAL UNITS)

AMOUNT TO LANDFILLS AND INCINERATORS				POINTS
REDUCED CONSTRUCTION WASTE		INCREASED WASTE DIVERSION		
POUNDS / FT <sup>2</sup>	CUBIC YARDS / 1,000 FT <sup>2</sup>	PERCENTAGE WASTE	PERCENTAGE DIVERTED	
4.0	25.5	100%	0%	0.0
3.5	22.3	88%	13%	0.0
3.0	19.1	75%	25%	0.5
2.5	15.9	63%	38%	1.0
2.0	12.8	50%	50%	1.5
1.5	9.6	38%	63%	2.0
1.0	6.4	25%	75%	2.5
0.5	3.2	12%	88%	3.0

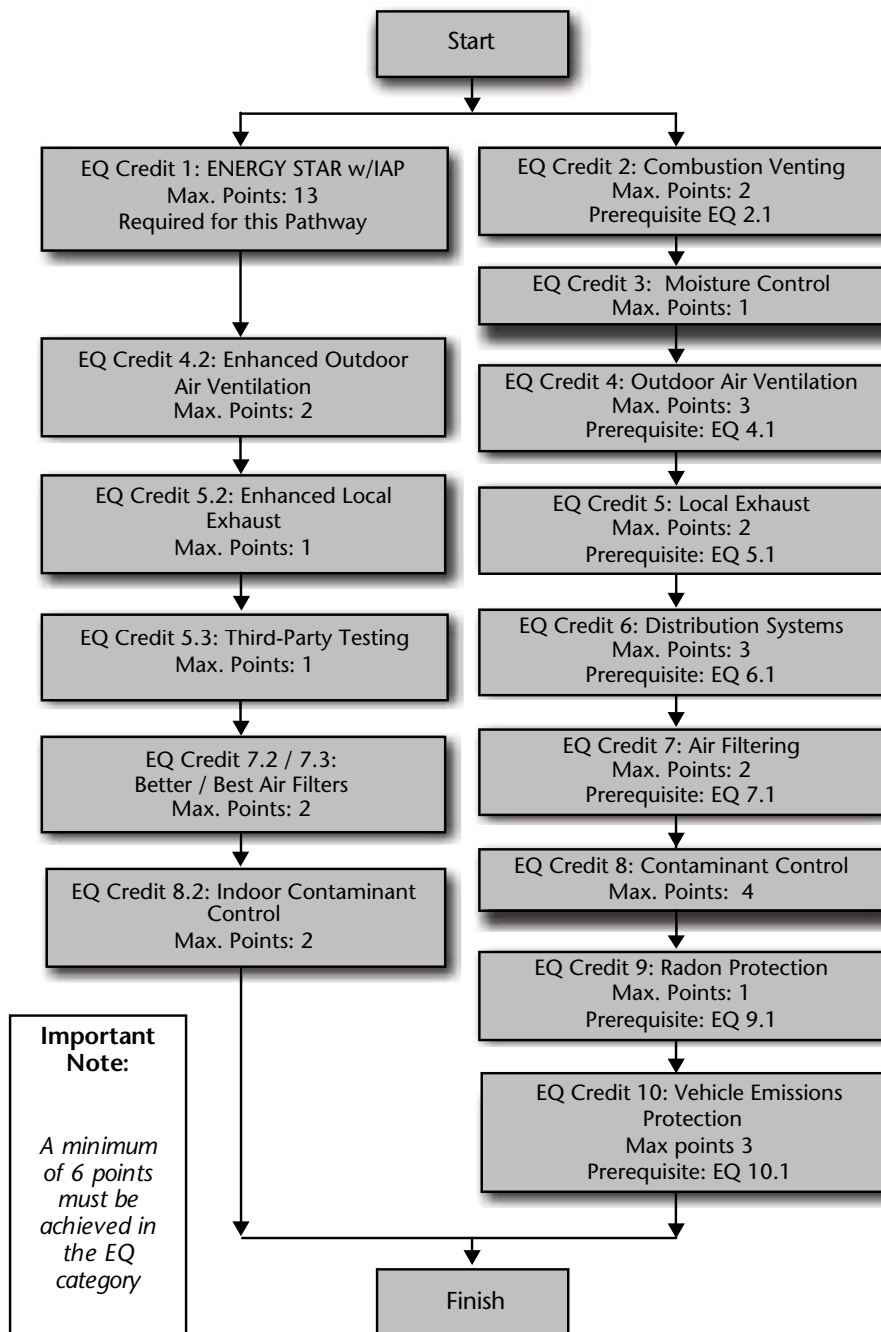
## SYNERGIES AND TRADE-OFFS

Waste can be minimized by creating a detailed framing plan and using advanced framing techniques or off-site fabrication (MR 1).

The use of products with reclaimed or recycled content (MR 2.2) reduces both the production of new materials and the burden on landfills.

# INDOOR ENVIRONMENTAL QUALITY (EQ)

## OPTIONAL PATHWAYS THROUGH THE EQ CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# INDOOR ENVIRONMENTAL QUALITY

## ENERGY STAR WITH INDOOR AIR PACKAGE

### INTENT

Improve the overall quality of a home's indoor environment by installing an approved bundle of air quality measures. The CaGBC recognizes that at this time this credit is not available in Canada, but understands that NRCan is working to bring the ENERGY STAR Indoor Air Package to Canada and has included it as a future path option.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **1.1 ENERGY STAR with Indoor Air Package** (13 points).

Complete all the requirements of the ENERGY STAR with Indoor Air Package (IAP).

### SYNERGIES AND TRADE-OFFS

A project receiving points for this credit may skip the prerequisites in EQ 2—10, and is not eligible to earn points in EQ 2.2, 3, 4.3, 6, 8.1, 8.3, 9, and 10.

Achieving the measures in EPA's Indoor Air Package may qualify a home to receive points in other categories of the *LEED® Canada for Homes* Rating System. See Table 28 for equivalencies.

TABLE 28: APPLICABILITY OF ENERGY STAR INDOOR AIR PACKAGE MEASURES TO LEED® CANADA FOR HOMES

ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

LEED® CANADA FOR HOMES PREREQUISITES / CREDITS	RELEVANT INDOOR AIR PACKAGE MEASURES	APPLICABILITY
Innovation & Design Process 2.1, 2.2	Various	Meeting Indoor Air Package specifications will address many durability issues listed in durability inspection checklist template.
Sustainable Sites 5	3.1–3.4	Depending on project location, meeting Indoor Air Package specifications may earn up to 2 LEED® points.
Energy & Atmosphere 6.1	4.1, 7.4	Meeting Indoor Air Package specifications achieves prerequisites EA 6.1(a) and 6.1(c).
Materials & Resources 2.2	6.3–6.9	Depending on project details, meeting Indoor Air Package specifications may earn up to 2 LEED® points.

ID	LL	SS	WE	EA	MR	EQ	AE
2							

# INDOOR ENVIRONMENTAL QUALITY

## COMBUSTION VENTING

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

#### **2.1 Basic Combustion Venting Measures.**

Meet all the following requirements.

- a. No unvented combustion appliances (e.g., decorative logs) are allowed.
- b. Carbon monoxide (CO) monitor must be installed on each floor.
- c. All fireplaces, woodstoves and pellet stoves are either EPA-certified or meet the CSA B 415 standard, except high-performance masonry heaters and wood cook stoves.
- d. Space and water heating equipment that involves combustion must meet one of the following:
  - 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

#### **2.2 Enhanced Combustion Venting Measures** (maximum 2 points).

Install no fireplace or woodstove, or design and install a fireplace or woodstove according to the requirements in Table 29.

TABLE 29. FIREPLACE AND STOVE COMBUSTION-VENTING REQUIREMENTS

ID	LL	SS	WE	EA	MR	<b>EQ</b>	AE
<b>2</b>							

FIREPLACE OR STOVE	ENHANCED COMBUSTION-VENTING MEASURES	
	BETTER PRACTICE (1 POINT)	BEST PRACTICE (2 POINTS)
None	See 'best practice'.	Granted automatically.
Masonry wood-burning fireplace	Install masonry heater as defined by American Society for Testing and Materials Standard E-1602 and International Building Code 2112.1.A.	Meet requirement for 'better practice', conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "Conducting a Back-Draft Potential Test" below) and meet CSA F326 (1991) requirements.
Factory-built wood-burning fireplace	Install equipment listed by approved safety testing facility (e.g., UL, CSA, ETL) that is certified either by the EPA or CSA B 415 and meets the following: equipment with catalytic combustor must emit less than 2.5 g/hr of particulate matter, and equipment without catalytic combustor must emit less than 4.5 g/hr of particulate matter. Alternately have the fireplace meeting the EPA voluntary low emission fireplace program.	Meet requirement for better practice, conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "Conducting a Back-Draft Potential Test," below) and meet CSA F326 (1991) requirements.
Woodstove and fireplace insert	Install equipment listed by approved safety testing facility (e.g., UL, CSA, ETL) that is certified either by the EPA or CSA B 415 and meets the following: equipment with catalytic combustor must emit less than 2.5 g/hr of particulate matter, and equipment without catalytic combustor must emit less than 4.5 g/hr of particulate matter.	Meet requirement for better practice, conduct back-draft potential test to ensure $\Delta P \leq 5$ Pascals (see "Conducting a Back-Draft Potential Test" below) and meet CSA F326 (1991) requirements.
Natural gas, or propane stove, or fireplace.	Install equipment listed by approved safety testing facility and that is power-vented or direct-vented and has permanently fixed glass front or gasketed door.	Meet requirement for better practice, select a unit that is EnerChoice-certified <i>and</i> include electronic (not standing) pilot.
Pellet stove	Install equipment that is either EPA certified or listed by approved safety testing facility to have met requirements of ASTM E 1509-04, "Standard Specification for Room Heaters, Pellet Fuel-Burning Type."	Meet requirement for better practice and include power venting or direct venting.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## CONDUCTING A BACK-DRAFT POTENTIAL TEST

Using the results from a blower door test, measure the pressure difference created by the presence of a chimney-vented appliance. To ensure a limited risk of back drafting, the pressure difference ( $\Delta P$ ) must be less than or equal to 5 Pascals, where:

$$\Delta P = (Q/C)^{1/n} \text{ (must be } \leq 5 \text{ Pascals)}$$

and Q is equal to the sum of the rated exhaust provided by the two biggest exhaust appliances in the home, and C and n are both constants produced by the blower-door test results.

## SYNERGIES AND TRADE-OFFS

A project pursuing EQ 2.2 must meet all the prerequisites in EQ 2–10.

# INDOOR ENVIRONMENTAL QUALITY

## MOISTURE CONTROL

ID	LL	SS	WE	EA	MR	EQ	AE
<b>3</b>							

### INTENT

Control indoor moisture levels to provide comfort, reduce the risk of mould, and increase the durability of the home.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **3.1 Moisture Load Control** (1 point).

Install dehumidification equipment with sufficient latent capacity to maintain relative humidity at or below 60%. This must be achieved through one of the following:

- a. Additional dehumidification system(s).
- b. A central HVAC system equipped with additional controls to operate in dehumidification mode.
- c. A passive ventilation design system if approved by a licensed design professional.

Note: *LEED® Canada for Homes* does not encourage active dehumidification for all projects. This credit may only work for projects with high humidity outdoor environments. Work with the HVAC contractor to determine whether this credit is appropriate and/or necessary. An appropriately sized ERV is considered an effective method of (de)humidification control.

### SYNERGIES AND TRADE-OFFS

A project receiving points for EQ 1 is not eligible to earn points in EQ 3. A project pursuing EQ 3 must meet all the prerequisites in EQ 2–10.

Water leakage through the building envelope can cause mould and other indoor environmental problems. Improved foundation, exterior walls, and roof water management should be addressed in the durability inspection checklist (ID 2).

In hot and humid climates, dehumidification can reduce the energy demands associated with air-conditioning (EA 1, 6).

ID	LL	SS	WE	EA	MR	EQ	AE
4							

# INDOOR ENVIRONMENTAL QUALITY

## OUTDOOR AIR VENTILATION

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

#### 4.1 Basic Outdoor Air Ventilation.

Design and install a whole-building ventilation system that complies with CSA F326 (1991) Residential Mechanical Ventilations Systems or ASHRAE Standard 62.2, Sections 4 and 7. A summary of alternatives is provided below, but the HVAC contractor should review and follow the requirements of ASHRAE Standard 62.2, Sections 4 and 7 or CSA F326 (1991).

- a. Continuous ventilation. Meet the ventilation requirements in Table 30 below.
- b. Intermittent ventilation according to CSA F326 (1991) Residential Mechanical Ventilations Systems or ASHRAE Standard 62.2, Sections 4 and 7.
- c. Passive ventilation. Have a passive ventilation system approved and verified by a licensed HVAC engineer as providing ventilation equivalent to that achieved by continuous ventilation systems as described in Table 30.

#### CREDITS

#### 4.2 Enhanced Outdoor Air Ventilation (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** (1 point).

Have a third party test the flow rate of air brought into the home, and verify that the requirements of CSA F326 Residential Mechanical Ventilations Systems are met. In exhaust-only ventilation systems, install exhaust ducts according CSA F326 Residential Mechanical Ventilations Systems, and either test the flow rate out of the home or conduct air-flow tests to ensure back pressure of  $\leq 5$  mm w.c (0.20 inches).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>4</b>							

TABLE 30A. MINIMUM AIR-FLOW REQUIREMENTS FOR CONTINUOUS VENTILATION SYSTEMS (IN CMM)

CONDITIONED FLOOR AREA (M <sup>2</sup> )	BEDROOMS				
	0, 1	2, 3	4, 5	6, 7	> 7
$\leq 139$	0.9	1.3	1.7	2.1	2.5
140–279	1.3	1.7	2.1	2.5	3.0
280–418	1.7	2.1	2.5	3.0	3.4
419–557	2.1	2.5	3.0	3.4	3.8
558–697	2.5	3.0	3.4	3.8	4.3
> 698	3.0	3.4	3.8	4.3	4.7

TABLE 30B. MINIMUM AIR-FLOW REQUIREMENTS FOR CONTINUOUS VENTILATION SYSTEMS (IN CFM)

CONDITIONED FLOOR AREA (FT <sup>2</sup> )	BEDROOMS				
	0, 1	2, 3	4, 5	6, 7	> 7
$\leq 1,500$	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

**SYNERGIES AND TRADE-OFFS**

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

Natural air leakage through the envelope contributes to the overall ventilation rate of the home (EA 3.1–3.3). From a health perspective, it is important not to underventilate 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 provide the outdoor air ventilation system for the home.

A heat recovery system can substantially reduce the energy used by the heating and cooling equipment (EA 6).

ID	LL	SS	WE	EA	MR	EQ	AE
5							

# INDOOR ENVIRONMENTAL QUALITY

## LOCAL EXHAUST

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

#### 5.1 Basic Local Exhaust.

Meet all the following requirements:

- Design and install local exhaust systems in all bathrooms (including half-baths) and kitchens to meet the requirements of NBC sct. 9.32 or local prevailing code, whichever is more stringent. Sample requirements that relate to minimum intermittent local exhaust flow rates are shown in Table 31, below.
- Design and install the fans and ducts to meet the requirements of NBC sct. 9.32 or local prevailing code, whichever is more stringent.
- Exhaust air to the outdoors (i.e., exhaust to attics or interstitial spaces is not permitted).
- Use ENERGY STAR labeled bathroom exhaust fans (except for exhaust fans serving multiple bathrooms). The sound level of the fan will not exceed one sone.

TABLE 31. MINIMUM AIR-FLOW REQUIREMENTS FOR INTERMITTENT LOCAL EXHAUST

LOCATION	MINIMUM AIR FLOW
Kitchen	2.83 cmm (100 cfm); vented range hood required if exhaust fan flow rate cannot achieve 5 kitchen air changes per hour.
Bathroom	1.42 cmm (50 cfm)

## CREDITS

**5.2 Enhanced Local Exhaust** (1 point).

Timer/automatic controls for principal bathroom exhaust fans using one of the following:

- 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. The sound level of the fan will not exceed one sone.

**5.3 Third-Party Performance Testing** (1 point).

Third-party testing of exhaust air flow rate out of home for compliance with NBC or local prevailing code, whichever is more stringent.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>5</b>							

## 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 a sufficient outdoor air ventilation system for the entire home, as required by EQ 4.1.

ID	LL	SS	WE	EA	MR	EQ	AE
6							

# INDOOR ENVIRONMENTAL QUALITY

## DISTRIBUTION OF SPACE HEATING AND COOLING

### INTENT

Provide appropriate distribution of space heating and cooling in the home to improve thermal comfort and energy performance.

### REQUIREMENTS

#### A. FORCED-AIR SYSTEMS:

#### PREREQUISITES

##### **6.1 Room-by-Room Load Calculations.**

Perform design calculations using CSA F280, the HRAI Standard for Residential Design, the ASHRAE Handbook of Fundamentals, or an equivalent computation procedure, and install ducts accordingly.

#### CREDITS

##### **6.2 Return Air Flow** (1 point).

Ensure that every room (except baths, kitchens, closets, pantries, and laundry rooms) has adequate return air flow through the use of multiple returns, transfer grilles, or jump ducts. Meet one of the following requirements:

- a. Size the opening to 2.3 square centimetres per 0.01 cmm (1 square inch per cfm) of supply (this area may include free area undercut below door).
- b. Demonstrate that the pressure differential between closed rooms and adjacent spaces with return is no greater than 2.5 Pa [0.25 mm w.c. (0.01 inch w.c.)].

##### **6.3 Third-Party Performance Test** (2 points).

Have the total supply air-flow rates in each room tested using a flow hood with doors closed, or one of the other acceptable methods cited by CSA F280 or the HRAI Standard for Residential Design. Supply air-flow rates must be within +/- 20% [or +/- 0.28 cmm (10 cfm)] of calculated values from CSA F280 or the HRAI Standard for Residential Design (as required by EA 6.1). Test results are to be averaged over the whole system. One point is awarded for testing the system and a second point is awarded if the system is balanced.

## B. NONDUCTED HVAC SYSTEMS (E.G., HYDRONIC SYSTEMS):

## PREREQUISITES

**6.1 Room-by-Room Load Calculations.**

Perform design calculations (using CSA F280, the HRAI Standard for Residential Design, the ASHRAE Handbook of Fundamentals, or an equivalent computation procedure) and install system accordingly.

## CREDITS

**6.2 Room-by-Room Controls** (1 point).

Design the HVAC system with flow control valves on every radiator.

**6.3 Multiple Zones** (2 points).

Install nonducted HVAC system with at least two distinct zones with independent thermostat controls.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>6</b>							

**SYNERGIES AND TRADE-OFFS**

A project receiving points for EQ 1 is not eligible to earn points in EQ 6.2 or EQ 6.3. A project pursuing EQ 6.2 or EQ 6.3 must meet all the prerequisites in EQ 2–10.

The choice of air filter (EQ 7) should be made prior to duct design, to ensure adequate air flow. Filters with a high MERV can create a large pressure drop that should be accommodated during system design.

Space heating and cooling loads and room air-flow rates must be calculated using CSA F280 or the HRAI Standard for Residential Design.

Duct installation should be visually inspected during the pre-drywall insulation inspection (EA 5).

ID	LL	SS	WE	EA	MR	EQ	AE
7							

# INDOOR ENVIRONMENTAL QUALITY

## AIR FILTERING

### INTENT

Reduce particulate matter from the air supply system.

### REQUIREMENTS

#### A. FORCED-AIR SYSTEMS:

##### PREREQUISITES

##### **7.1 Good Filters.**

Install air filters with a minimum efficiency reporting value (MERV)  $\geq 8$  and ensure that air handlers can maintain an appropriate system pressure drop. Air filter housings must be airtight to prevent bypass or leakage.

##### CREDITS

##### **7.2 Better Filters** (1 point).

Install air filters  $\geq$  MERV 10 and ensure that air handlers can maintain an appropriate system pressure drop. Air filter housings must be airtight to prevent bypass or leakage.

##### OR

##### **7.3 Best Filters** (2 points).

Install air filters  $\geq$  MERV 13 and ensure that air handlers can maintain an appropriate system pressure drop. Air filter housings must be airtight to prevent bypass or leakage.

#### B. NONDUCTED HVAC SYSTEMS (E.G., HYDRONIC SYSTEMS):

##### PREREQUISITES

##### **7.1 Good Filters.**

Install air filters  $\geq$  MERV 8 and maintain adequate pressure and air flow in any mechanical ventilation systems. A home in a climate with fewer than 4,500 infiltration degree-days, or a home that uses only passive or exhaust-only ventilation, is exempt from this requirement.

CREDITS

**7.2 Better Filters** (1 point).

Install air filters  $\geq$  MERV 10 and maintain adequate pressure and air flow for any mechanical ventilation systems.

**7.3 Best Filters** (2 points).

Install air filters  $\geq$  MERV 13 and maintain adequate pressure and air flow for any mechanical ventilation systems.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>7</b>							

**SYNERGIES AND TRADE-OFFS**

A project receiving points for EQ 1 is eligible to earn points for EQ 7.2 or EQ 7.3.

The choice of air filter should be made during or prior to duct design (EQ 6) to ensure adequate air flow. Filters with a high MERV can create a large pressure drop that should be accommodated during system design.

ID	LL	SS	WE	EA	MR	EQ	AE
8							

# INDOOR ENVIRONMENTAL QUALITY

## CONTAMINANT CONTROL

### INTENT

Reduce occupants' and construction workers' exposure to indoor airborne contaminants through source control and removal.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **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** (1 point each, maximum 2 points).

Select from the following measures:

- a. Design and install permanent walk-off mats at each entry that are at least 1.2 metres (4 ft) in length and allow accessibility for cleaning (e.g., grating with catch basin).
- b. Design a shoe removal and storage space near the primary entryway, 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 two pairs of shoes per bedroom.
- c. Install a central vacuum system with exhaust to the outdoors. Ensure that the exhaust is not near any ventilation air intake.

**8.3 Preoccupancy Flush** (1 point).

Flush the home with fresh air, according to the following guidelines:

- a. Flush prior to occupancy after all phases of construction is completed.
- b. Flush the entire home, keeping all interior doors open.
- c. Flush for 48 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.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>8</b>							

**SYNERGIES AND TRADE-OFFS**

A project receiving points for EQ 1 is not eligible to earn points for EQ 8.1 or EQ 8.3, but may earn points for EQ 8.2.

Products with low VOC emissions greatly benefit indoor air quality. Source control of these kinds of emissions is addressed in MR 2.

ID	LL	SS	WE	EA	MR	EQ	AE
9							

# INDOOR ENVIRONMENTAL QUALITY

## RADON PROTECTION

### INTENT

Reduce occupant exposure to radon gas and other soil gas contaminants.

### REQUIREMENTS

#### PREREQUISITES

#### **9.1 Radon-Resistant Construction: Passive ventilation.**

A passive sub-slab or sub-membrane depressurization system is installed with the ability to add active underslab ventilation if and when it is confirmed to be needed. Gas can flow under the membrane or foundation to a vent pipe that exhausts radon from the house using a natural draft.

Your Provider can supply information on the basic components of radon resistant construction for a typical house. Some information can be seen on the EPA website: [www.epa.gov/radon/rrenc/basic\\_techniques\\_builder.html](http://www.epa.gov/radon/rrenc/basic_techniques_builder.html). Testing is an alternative and if no radon issues are present, then the prerequisite has been met. If radon issues are detected from the test then a mitigation strategy including sub slab ventilation must be installed.

#### CREDITS

#### **9.2 Radon-Resistant Construction** (1 point).

Active sub-slab or sub-membrane depressurization system is installed.

Note: Radon-resistant construction does not guarantee that occupants will not be exposed to radon. Information about radon testing is available on the EPA website, at [www.epa.gov/radon/radontest.html](http://www.epa.gov/radon/radontest.html).

### SYNERGIES AND TRADE-OFFS

A project receiving points for EQ 1 is not eligible to earn points for EQ 9.2.

# INDOOR ENVIRONMENTAL QUALITY

## GARAGE POLLUTANT PROTECTION

ID	LL	SS	WE	EA	MR	EQ	AE
<b>10</b>							

### INTENT

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

### REQUIREMENTS

#### PREREQUISITES

#### **10.1 No HVAC in Garage.**

Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage.

#### CREDITS

#### **10.2 Minimize Pollutants from Garage** (2 points).

Tightly seal shared surfaces between garage and conditioned spaces, including all of the following:

- a. In conditioned spaces above the garage:
  - i. seal all penetrations;
  - ii. seal all connecting floor and ceiling joist bays.
- b. In conditioned spaces next to the garage:
  - i. weather-strip all doors;
  - ii. place carbon monoxide detectors in adjacent rooms that share a door with the garage;
  - iii. seal all penetrations; and
  - iv. seal all cracks at the base of the walls.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>10</b>							

**AND/OR****10.3 Exhaust Fan in Garage** (1 point).

Install an exhaust fan in the garage that is rated for continuous operation and designed to be operated in one of the following ways. Nonducted exhaust fans must be 2 cmm (70 cfm or greater), and ducted exhaust fans must be 2.8 cmm (100 cfm) or greater.

- a. Fan must run continuously; or
- b. Fan must be designed with an automatic timer control linked to an occupant sensor, light switch, garage door opening-closing mechanism, carbon monoxide sensor, or equivalent. The timer must be set to provide at least three air changes each time the fan is turned on.

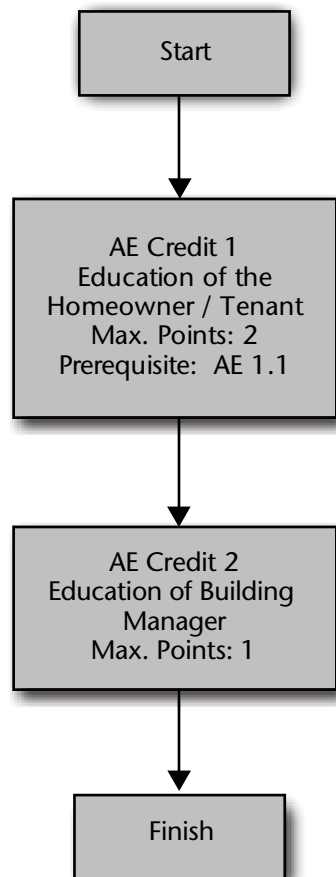
**OR****10.4 Detached Garage or No Garage** (3 points).**SYNERGIES AND TRADE-OFFS**

A project receiving points for EQ 1 is not eligible to earn points in EQ 10.2, EQ 10.3 or EQ 10.4. A project receiving points for EQ 10.4 is not eligible to earn points for EQ 10.2 or 10.3, and vice versa.

EQ 10.1 should be taken into consideration when designing the HVAC and heating and cooling distribution system (EA 5, 6; EQ 4, 6).

# AWARENESS & EDUCATION (AE)

## PATHWAY THROUGH THE AE CATEGORY



ID	LL	SS	WE	EA	MR	EQ	AE
1							

# AWARENESS & EDUCATION

## EDUCATION OF THE HOMEOWNER OR TENANT

### INTENT

Maintain the performance of the home by educating the occupants (i.e., the homeowner or tenant) about the operations and maintenance of the home's LEED® features and equipment.

### REQUIREMENTS

#### PREREQUISITES

#### 1.1 Basic Operations Training.

Provide the home's occupant(s) with the following:

- a. An operations and maintenance manual or binder that includes all the following items:
  - i. The completed checklist of *LEED® Canada for Homes* features.
  - ii. A copy of each signed Accountability Form.
  - iii. A copy of the durability inspection checklist.
  - iv. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.
  - v. General information on efficient use of energy, water, and natural resources.
  - vi. Operations and maintenance guidance for any *LEED® Canada for Homes*-related equipment installed in the home, including:
    - space heating and cooling equipment;
    - mechanical ventilation equipment;
    - humidity control equipment;
    - radon protection system;
    - renewable energy system; and
    - irrigation, rainwater harvesting, and/or greywater system.
  - vii. Guidance on occupant activities and choices, including the following:
    - cleaning materials, methods, and supplies;
    - water-efficient landscaping;
    - impacts of chemical fertilizers and pesticides;
    - irrigation;
    - lighting selection; and
    - appliance selection.
  - viii. Educational information on "green power."
- b. Minimum one-hour walkthrough of the home with the occupant(s), featuring the following:
  - i. Identification of all installed equipment.
  - ii. Instruction on how to use the measures and operate the equipment.
  - iii. Information on how to maintain the measures and equipment.

## CREDITS

**1.2 Enhanced Training** (1 point).

Provide two hours of training for the occupant(s) in addition to the training provided for AE 1.1. Examples of eligible trainings include:

- An additional walkthrough or training held in another home that has similar green measures and equipment.
- A builder or developer sponsored meeting of potential homebuyers that informs participants of the unique features of a LEED® home.
- A group homebuyer training that includes discussion of the required items in the occupant's operations and maintenance manual, including information on efficient use of resources, appropriate use of measures and systems, and proper maintenance of measures and systems.
- A homebuyer DVD with operations and maintenance information on the home's *LEED® Canada for Homes* measures.

**1.3 Public Awareness** (1 point).

Promote general public awareness about *LEED® Canada for Homes* by conducting at least three of the following activities:

- Hold an advertised, attended public open house that lasts at least four hours per day on at least four weekends, or participate in a green building exhibition or tour. The home or building must display at least four informational stations about the *LEED® Canada for Homes* features (and/or offer a guided tour that highlights at least four *LEED® Canada for Homes* features).
- Publish a website with at least two pages that provides detailed information about the features and benefits of LEED® homes.
- Generate a newspaper article on the *LEED® Canada for Homes* project.
- Display *LEED® Canada for Homes* signage, measuring 0.6 square metres (6 sq ft) or more, on the exterior of the home or building.

**SYNERGIES AND TRADE-OFFS**

Many of the measures in the Rating System should be addressed in the operations manual and the on-site training, particularly any measures that require routine maintenance (e.g., air filters) or instruction for proper operation (e.g., heat recovery systems).

ID	LL	SS	WE	EA	MR	EQ	AE
<b>1</b>							

ID	LL	SS	WE	EA	MR	EQ	AE
2							

# AWARENESS & EDUCATION

## EDUCATION OF BUILDING MANAGER

### INTENT

Maintain the performance of the home by educating the building manager about the operations and maintenance of the home's LEED® features and equipment.

### REQUIREMENTS

#### PREREQUISITES

None.

#### CREDITS

#### **1.1 Education of Building Manager** (1 point).

For multifamily buildings (more than five units), provide the building manager with the following:

- a. A building owner's manual or binder that includes these items:
  - i. The completed checklist of *LEED® Canada for Homes* features.
  - ii. A copy of each signed Accountability Form.
  - iii. A copy of the durability inspection checklist.
  - iv. The product manufacturers' manuals for all installed equipment, fixtures, and appliances.
  - v. General information on efficient use of energy, water, and natural resources.
  - vi. Operations and maintenance guidance for any *LEED® Canada for Homes*-related equipment installed in the home, including:
    - 9.1.1 space heating and cooling equipment;
    - 9.1.2 mechanical ventilation equipment;
    - 9.1.3 humidity control equipment;
    - 9.1.4 radon protection system;
    - 9.1.5 renewable energy system; and
    - 9.1.6 irrigation, rainwater harvesting, and/or greywater system.
  - vii. Guidance on occupant activities and choices, including the following:
    - cleaning materials, methods, and supplies;
    - water-efficient landscaping;
    - impacts of chemical fertilizers and pesticides;
    - irrigation;
    - lighting selection; and
    - appliance selection.
  - viii. Educational information on "green power."

- b. A minimum one-hour walkthrough of the building before occupancy, featuring the following:
- i. Identification of all installed equipment.
  - ii. Instruction on how to use the measures and operate the equipment in each unit.
  - iii. Information on how to maintain the measures and equipment in each unit.

ID	LL	SS	WE	EA	MR	EQ	AE
<b>2</b>							

## SYNERGIES AND TRADE-OFFS

Many of the measures in the Rating System should be addressed in the building manager's manual and on-site training, particularly any measures that require routine maintenance (e.g., air filters) or specific instruction for proper operation (e.g., heat-recovery systems).

## ABBREVIATIONS AND ACRONYMS

ACCA	– Air Conditioning Contractors of America
AE	– Awareness & Education section
AFUE	– annual fuel utilization efficiency
ALP	– ENERGY STAR Advanced Lighting Package
AP	– LEED® Accredited Professional
ASHRAE	– American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	– American Society of Mechanical Engineers
ASTM	– American Society for Testing and Materials
CAE	– combined annual efficiency
CaGBC	– Canada Green Building Council
CanSIA	– Canadian Solar Industry Association
CFA	– conditioned floor area
CFC	– chlorofluorocarbon
CFL	– compact fluorescent lightbulb
CFM	– cubic feet per minute
CFR	– US Code of Federal Regulations
CIR	– Credit Interpretation Request
CMM	– cubic metre per minute
CO	– carbon monoxide
COC	– chain of custody
COP	– coefficient of performance
CRI	– Carpet & Rug Institute
CSA	– Canadian Standards Association
CZ	– climate zone
DHW	– domestic hot water
DOE	– US Department of Energy
DU	– distribution uniformity
EA	– Energy & Atmosphere section
EER	– energy efficiency rating
EERE	– US Office of Energy Efficiency and Renewable Energy

EF	– energy factor
EPA	– US Environmental Protection Agency
EQ	– Indoor Environmental Quality section
ET	– evapotranspiration
FEMA	– US Federal Emergency Management Agency
FSC	– Forest Stewardship Council
GPF	– gallons per flush
GPM	– gallons per minute
HCFC	– hydrochlorofluorocarbon
HEPA	– high efficiency particle absorbing
HERS	– Home Energy Rating System
HET	– high efficiency toilet
HOA	– homeowner’s association
HRAI	– Heating Refrigeration and Air Conditioning Institute
HSPF	– heating season performance factor
HVAC	– heating, ventilation, and air conditioning
IAP	– ENERGY STAR with Indoor Air Package
IAQ	– indoor air quality
ICF	– insulated concrete form
ID	– Innovation & Design section
IDR	– Innovative Design Request
IECC	– International Energy Conservation Code
IRC	– International Residential Code
KW	– kilowatt
KWH	– kilowatt-hour
LED	– light-emitting diode
LEED	– Leadership in Energy and Environmental Design
LL	– Location & Linkages section
MEF	– modified energy factor
MERV	– minimum efficiency reporting value
MR	– Materials & Resources section
NBC	– National Building Code of Canada
NFRC	– National Fenestration Rating Council

NRCan	– Natural Resources Canada
OSB	– oriented strand board
RESNET	– Residential Energy Services Network
RSI	– Resistance (Systeme Internationale)
SCS	– Scientific Certification Systems
SEER	– seasonal energy efficiency rating
SHGC	– solar heat gain coefficient
SIP	– structural insulated panels
SRI	– solar reflectance index
SS	– Sustainable Sites section
TASC	– Technical Advisory Subcommittee
UL	– Underwriter’s Laboratory
USGBC	– US Green Building Council
VOC	– volatile organic compound
WC	– water column
WE	– Water Efficiency section
WF	– water factor
WFR	– window-to-floor ratio

## GLOSSARY

**adhesive** any substance used to bond one surface to another by attachment. Adhesives include adhesive bonding primers, adhesive primers, adhesive primers for plastics, and any other primer.

**albedo** a measure of the reflectivity of a surface. High-albedo materials are very reflective of solar radiation.

**balancing damper** an adjustable plate that regulates air flow within ducts.

**bedroom** in *LEED® Canada for Homes*, any room or space that could be used or is intended to be used for sleeping purposes and meets local fire and building code requirements.

**borate** a wood preservative that is nontoxic to humans but highly toxic to wood-boring insects, such as termites.

**buildable land** the portion of a site where construction can occur. Buildable land excludes public streets and other public rights-of-way, land occupied by nonresidential structures, public parks and land excluded from residential development by law.

**built environment** the man made alterations to a specific area, including its natural resources. On a home site, this includes everything that has been disturbed during construction.

**catchment** the surface area of a roof that captures rainwater for a rainwater harvesting system.

**central vacuum system** a network of tubing with inlets throughout the house designed to remove dust and debris to a remote receptacle. A central vacuum system is more efficient than a traditional vacuum cleaner.

**chain-of-custody** in forest certification, the path taken by raw materials, processed materials, and products from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution. A chain-of-custody certificate number on invoices for nonlabelled products indicates that the certifier's guidelines for product accounting have been followed. A chain-of-custody certification is not required by distributors of a product that is individually labelled with the Forest Stewardship Council logo and manufacturer's chain-of-custody number.

**charrette** an intensive, collaborative session in which a project team discusses design and construction options related to all aspects of the home.

**chlorofluorocarbon (CFC)** a chemical compound, once commonly used in refrigeration that depletes the stratospheric ozone layer.

**circulation loop** a system that returns cold water to the water heater (instead of down the drain) until hot water reaches the faucet. A circulation loop is one component of a structured plumbing system.

**climate zone** in Canada, there are four climate zones defined by Natural Resources Canada. Zone A is the hottest and Zone D is the coldest.

**closed combustion** a design for furnaces and water heaters in which the supply air is ducted from the outside and exhaust gases are ducted to the outdoors. All elements of the system are sealed to prevent combustion exhaust from leaking into the home.

**combustion exhaust gases** the most common gases resulting from fossil fuel combustion, including carbon dioxide, carbon monoxide, sulfur dioxide, and nitrogen oxides. These gases pose health hazards at high concentrations.

**compensating shower valves** designed to keep bathing water temperatures in the shower constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change or the bathing water outlet temperature changes. Two types of valves are available: *Thermostatic compensating valves* are designed to keep bathing water temperatures in the shower constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change or the bathing water outlet temperature changes. The response of this type of mechanism is different to that of a pressure balance compensating valve. *Pressure balance compensating valves* are designed to keep bathing water temperature in the shower constant when other appliances, such as a washing machine or toilet, are in use and when the hot or cold water supply pressures change.

**composite wood** a product consisting of wood or plant particles or fibres bonded together by a synthetic resin or binder. Examples include plywood, particleboard, oriented-strand board (OSB), medium-density fibreboard (MDF) and composite door cores.

**conditioned space** interior area that utilizes any method of air-conditioning or heating to control temperature and/or humidity levels, usually measured in cubic metres or cubic feet.

**conventional turf** grass, typically a monoculture that requires considerable watering, mowing, and/or fertilizers. What is considered conventional turf may vary by region.

**demand-controlled circulation** the automatic circulation of water, triggered by a switch or sensor, through a looped system to ensure that hot water is immediately available while keeping unused cold water in the system, saving both water and energy.

**density** the quantity of structures on a site, measured for residential buildings as dwelling units per acre of buildable land available for residential uses, and for nonresidential buildings as floor area ratio per net hectare of buildable land available for nonresidential uses.

**designed landscape** the arrangement of features on a site, including softscapes (e.g., grass, shrubs) and hardscapes (e.g., patios, fountains) but not areas under roof. Preserved natural areas are not considered part of the designed landscape.

**development** the homes and building lots that surround the new LEED® home project. A development may be new or preexisting. Preexisting developments may be referred to as the community.

**distribution uniformity** a metric for estimating how uniformly water is applied to an area. Distribution Uniformity (DU) ranges between 0 and 1, where 1 indicates that the irrigation system is providing perfectly equal coverage. A higher DU means less likelihood of overwatering or underwatering.

**disturbed lot area** the part of a site that is directly affected by construction activity, including any activity that would compact the soil or damage vegetation.

**diverted waste** debris from construction or demolition that is not sent to a landfill or incinerator. Strategies for diverting waste include reclamation, recycling and, for certain materials, mulching.

**drip irrigation system** a network of pipes and valves that rest on the soil or underground and slowly deliver water to the root systems of plants. Drip irrigation saves water by minimizing evapotranspiration and topsoil runoff. Drip irrigation usually involves a network of pipes and valves that rest on the soil or underground at the root zone.

**dry well** an underground structure that collects runoff and distributes it over a large area, increasing absorption and minimizing erosion.

**dual-flush toilet** a toilet with two flush volumes, one for solid waste and a reduced volume for liquid waste.

**durability** the ability of a building or any of its components to perform its required function in its service environment over time without unforeseen cost for maintenance or repair.

**ecologically sensitive land** includes rare or fragile ecosystems, places of significant and recognized biodiversity or habitat for rare and endangered species.

**edge development** generally, a group of homes that extend an existing community beyond its borders but remain connected to it. In *LEED® Canada for Homes*, at least 25% of an edge development's perimeter must border land that has been previously developed.

**Energuide for houses** an energy evaluation service developed by Natural Resources Canada to improve the comfort and energy efficiency of Canadian homes.

**ENERGY STAR home** a home built to a high standard of energy efficiency (at least 15% more efficient than the International Energy Conservation Code). For more information, visit [www.energystar.gov/homes](http://www.energystar.gov/homes).

**ENERGY STAR with Indoor Air Package (IAP)** a certification program that recognizes homes with systems to ensure high standards of indoor air quality and rated as ENERGY STAR homes.

**envelope** see *thermal envelope*.

**environmentally preferable products** products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services designed for the same purpose.

**erosion** a process in which materials of the earth's surface are loosened, dissolved or worn away and transported by natural agents, such as water, wind or gravity.

**fly ash** the fine ash residue from coal combustion. Fly ash can be substituted for Portland cement, a bonding material in concrete.

**formaldehyde** a naturally occurring volatile organic compound used as a preservative. When present in high concentrations, formaldehyde can cause headaches, dizziness, mental impairment, and other symptoms—and may be a carcinogen.

**Green Rater** an individual who performs field inspections and performance testing of *LEED® Canada for Homes* measures for the *LEED® Canada for Homes* Provider. A HERS rater or certified Energuide advisor with additional training can become a Green Rater.

**greywater** wastewater that comes from household baths and clothes washers and is neither clean nor heavily soiled. More specifically, untreated household wastewater which has not come into contact with toilet waste. Greywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washers and laundry tubs, and depending on the local code may or may not include wastewater from kitchen sinks or dishwashers.

**hardscape** "elements added to a natural landscape, such as paving stones, gravel, walkways, irrigation systems, roads, retaining walls, sculpture, street amenities, fountains, and other mechanical features" (American Society of Landscape Architects). Hardscapes are often impermeable, but not by definition.

**high-efficiency toilet (HET)** a toilet that uses no more than 4.9 litres (1.3 gallons) per flush.

**Home Energy Rating System (HERS) index** a system for evaluating the energy efficiency of a home using an energy simulation model. A HERS index of 100 represents the energy efficiency of a home that meets basic IECC code requirements; each additional index point represents a 1% increase in energy use, and lower index numbers indicate the percentage savings in energy use.

**hydrochlorofluorocarbon (HCFC)** a chemical compound used as a refrigerant. HCFCs deplete the stratospheric ozone layer but to a lesser extent than chlorofluorocarbons (CFCs).

**hydronic system** a heating or cooling system that uses circulating water as the heat-transfer medium, such as a boiler with hot water circulated through radiators.

**infill site** a lot in an existing community. In *LEED® Canada for Homes*, an infill site is defined as having at least 75% of its perimeter bordering land that has been previously developed.

**infiltration degree-days** the sum of the heating degree-days and the cooling degree-days.

**invasive species** “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health” (Executive Order 13112). Not all nonnative species are considered invasive, and invasive species differ by region. Regional agencies that list invasive species are available at <http://www.rbg.ca/cbcn/en/projects/invasives/invade1.html>.

**ladder blocking** a method of framing in which interior partition walls meet and are reinforced by exterior walls, with minimal framing.

**light fixture** illumination that is permanently fixed to the home. A fluorescent light fixture has an integrated ballast. A compact fluorescent lamp (CFL) is not a light fixture.

**local heat island effect** the incidence of higher air and surface temperatures caused by the absorption of solar energy and its reemission from roads, buildings and other structures.

**lot** the individual parcel of land on which a home is to be built.

**minimum efficiency reporting value (MERV)** the effectiveness of a mechanical air filter based on the number and size of the particles that pass through it under normal conditions. The higher the rating, the more effective the filter.

**native plant** a plant that has evolved within the particular habitat that it is being used. Native plants provide food and shelter to indigenous wildlife and grow in balance with surrounding plant and animal species. The characterization of a plant as ‘native’ may vary regionally and even locally.

**no-disturbance zone** an area that is preserved during construction.

**postconsumer recycled content** material used and then recycled by consumers, as distinguished from the recycled by-products of manufacturing, called preconsumer (postindustrial) recycled content.

**postconsumer waste** material generated by households or by commercial, industrial and institutional facilities that can no longer be used for its intended purpose. This includes returns of materials from the distribution chain (Source: ISO 14021). Examples include construction and demolition debris, materials collected through recycling programs, broken pallets (from a pallet refurbishing company, not a pallet-making company), discarded cabinetry and decking, and home maintenance waste (leaves, grass clippings, tree trimmings).

**potable** suitable for drinking. Potable water is generally supplied by municipal water systems.

**power-vented exhaust** the use of an active fan system to pull combustion gases out of the home. Combustion equipment with power venting can use indoor air as the combustion supply air.

**preconsumer content** material diverted from the waste stream during the manufacturing process. Formerly known as postindustrial content. Examples include planer shavings, plytrim, sawdust, chips, bagasse, culls, trimmed materials and obsolete inventory. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it (Source ISO 14021).

**previously developed land** having pre-existing paving, construction, or significantly altered landscapes. This does not apply to altered landscapes resulting from current agricultural use, forestry use, or use as preserved natural area.

**previously developed site** in *LEED® Canada for Homes*, a lot consisting of at least 75% previously developed land.

**Provincial Agricultural Land Reserve or Forest Land Reserve** is officially designated areas protecting prime agricultural land and forests.

**project** the design and construction of a LEED® home. A project may include multiple homes in a development.

**Provider** an organization that recruits, trains and coordinates *LEED® Canada for Homes* Green Raters to serve as third-party verifiers of LEED® homes. Providers are the official certifiers of *LEED® Canada for Homes* on behalf of the Canada Green Building Council.

**radon** a radioactive gas that naturally vents from the ground. Not all homes have problems with radon. High levels of radon are known to be carcinogenic.

**rain garden** a swale, or low tract of land into which water flows, planted with vegetation that requires or tolerates high moisture levels. A rain garden can be designed to reduce the volume of water entering storm drains and replenish groundwater.

**reclaimed material** building components that have been recovered from a demolition site and are reused in their original state (i.e., not recycled). Also known as salvaged or reused material.

**recycled content** the weight of recycled material, including both postconsumer and preconsumer (postindustrial) material, divided by the overall weight of the assembly.

**recycling** the collection, reprocessing, marketing and use of materials that were diverted or recovered from the solid waste stream.

**refrigerant** a fluid that absorbs heat from a reservoir at low temperatures and rejects heat at higher temperatures.

**reuse** the return of salvaged materials to use in the same or a related capacity.

**R-value** a measure of thermal resistance, defined as the number of watts lost per square meter at a given temperature difference. R-value is the inverse of U- value (i.e.,  $R = 1/U$ ).

**salvaged material** see 'reclaimed material'.

**sedimentation** the deposition of soil and other natural solids in waterbodies. Sedimentation decreases water quality and accelerates the aging process of lakes, rivers and streams.

**siltation** the deposition and accumulation of fine very particles in waterbodies. Siltation is often harmful to lake, river and stream ecosystems.

**site** the individual building lot where a home is to be built. A site may include all of the lots that a builder is responsible for softscape the natural elements of a landscape, such as plant materials and soil. Softscapes can include hard elements, such as rocks.

**solar heat gain coefficient (SHGC)** a measure of how well a window blocks heat from the sun, expressed as a fraction of the heat from the sun that enters the window. A lower SHGC is generally preferable, particularly in hot climates.

**solar window screen** mesh used to block light and heat from the sun, as well as insects.

**subdivision** the homes and building lots that immediately surround the new LEED® home project that is to be built. A subdivision may be new or preexisting, and belongs to a larger development.

**sustainable forestry** the practice of managing forest resources to meet the long-term forest product needs of humans while maintaining the integrity of forested landscapes and sustaining a full range of forest values—economic, social and ecological.

**Technical Advisory Sub-Committee** in *LEED® Canada for Homes*, a group of specialists who rule on Credit Interpretation Requests and Innovative Design Requests.

**termite** a wood-eating social insect (order Isoptera) that can cause serious structural damage to buildings. Also known as white ant.

**thermal bridge** a part of a building envelope that has high heat conductance, lowering the average R-value.

**thermal envelope** the thermal enclosure created by the building exterior and insulation.

**topsoil** The uppermost layer of soil, containing high levels of nutrients and organic matter. Healthy topsoil is essential for the survival of trees and plants.

**tree/plant preservation plan** A formal assessment of the lot and a development of a landscaping plan that seeks to preserve the most trees and native plants. This is important to do as one of the first steps in the design process to ensure the developed area takes into account the preservation plan.

**ureaformaldehyde** a combination of urea and formaldehyde used in some glues and adhesives, particularly in composite wood products. At room temperature, ureaformaldehyde emits formaldehyde, a toxic and possibly carcinogenic gas.

**U-value** a measure of thermal conductivity (often used for windows) that is the inverse of R-value. A lower U-value means a more energy-efficient window. Also known as U-factor.

**vegetated roof** a roof partially or fully covered by vegetation, used to manage water runoff and provide additional insulation in winter and cooling in summer.

**vegetated swale** *see rain garden.*

**volatile organic compound (VOC)** a carbon compound that vaporizes (becomes a gas) at normal room temperatures. VOCs contribute to air pollution directly and through atmospheric photochemical reactions to produce secondary air pollutants, principally ozone and peroxyacetyl nitrate.

**walk-off mat** an exterior pad or grate designed to trap dust and debris.

**water** a natural body of water or previously constructed body of water or waterway. Some examples include a stream, a river, a creek, a lake, a pond, or the ocean.

**wetland** an area inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. A river or creek is not considered a wetland. Manmade wetlands are excluded from the requirements of SSc1 if constructed as part of an overall storm system management approach.