



# PIMA COUNTY REGIONAL RESIDENTIAL GREEN REMODELING RATING SYSTEM

*This version for use within the:*

## **PIMA COUNTY GREEN BUILDING PROGRAM**

DIVISION OF BUILDING SAFETY & SUSTAINABILITY  
PIMA COUNTY DEVELOPMENT SERVICES DEPARTMENT  
201 NORTH STONE AVENUE  
TUCSON, AZ 85701

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*Endorsed by:*

Governing Council of the Southern Arizona USGBC  
Tucson/Pima Metropolitan Energy Commission  
Development Center for Appropriate Technology  
Tucson Botanical Gardens  
Water CASA  
Southern Arizona Home Builders Association



**PIMA COUNTY REGIONAL RESIDENTIAL GREEN REMODELING RATING SYSTEM**

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## **LOCAL CONTEXT**

While national standards for residential green building have been available for some time (LEED for Homes, NAHB National Green Building Program, etc.), none completely captures the particulars of our local Sonoran desert environment primarily due to lack of regional amendment components. Hence, the same standard applies to the northeast as to the southwest. In response to this concern, community stakeholders have participated in public meetings under the auspices of the Green Building Subcommittee of the Joint County/City Building Code Committee for a period of almost two years. These efforts produced an initial draft amended version of the original NAHB Model Green Home Building Guidelines.

In order to validate the locally amended draft, a study was undertaken comparing it to LEED for Homes, NAHB Model Green Home Building Guidelines (unamended), and the City of Scottsdale rating system through evaluating five house designs of differing levels of “greenness” sited in several theoretical locations across the City and County. This unique study, to be published in *Environmental Design & Construction*, has shed light upon the merits of each rating system, exposing the deficiencies in each and facilitating the further refinement of our local standard through revealing missed elements within the first draft, as well as capturing the best of national standards.

The green building element most prominent within the local context is water conservation, and from water conservation flows energy conservation since thermo-electric generation consumes 0.75 gallon of water for every kWh of electricity generated—this amount of energy is equivalent to a single 100 Watt bulb burning for 10 hours. Hence reducing thermo-electric generated energy consumption saves water. This local standard has thus placed more emphasis in areas pertaining to water and energy.

Other elements incorporated within this standard are derived from the local climate which includes large diurnal temperature swings as well as hot dry conditions with ample sunshine. One such element is passive mass wall design which may even incorporate indigenous structural materials such as adobe and rammed earth.

Finally, biases present in national standards derived from serving specific industries were removed. Examples of these are low-VOC paints or green carpeting which while these are appropriately awarded points in national standards, the even more environmentally friendly approach of not using any of these materials is not. This standard therefore awards points for using exposed structural surfaces comprising the finish material such as concrete slabs and masonry walls.

This regional rating system is a living document, slated to be amended by all participating jurisdictions every six months.

## **INTENT**

There are many green building programs available for homebuilders to measure and verify their efforts towards building a new green home, however, remodeling and renovating existing structures may be the *greenest* way to build. Existing housing stock often has historical character, is of durable construction and offers affordability, but may leave much to be desired in the areas of energy efficiency, indoor air quality and water conservation. Fortunately, there are many opportunities to “green” a house during remodeling that do not need to add prohibitive cost to the project. The following remodeling rating system is designed to allow builders and homeowners to

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certify their remodeling and renovation projects under the programs of participating jurisdictions. The ratings are based on the most appropriate strategies available for improving the quality and performance of existing housing stock commonly found in the Pima County region. Projects consisting of general remodels, system upgrades, additions, and kitchen/bath upgrades may all be certified under this rating system. Substantial renovations consisting of replacement of all major systems or renovation of more than 75% of the structure may be more suited to *the Pima County Regional Residential Green Building Rating System* that is generally applied to new homes. Questions regarding which rating system should be used may be directed to the Green Building Program Manager.

The rating system provides four levels of certification:

- Bronze Certification: 20-25 points
- Silver Certification: 26-50 points
- Gold Certification: 51-75 points
- Emerald Certification: 76 or more points

Additions and remodeling projects must involve a minimum of 500 square feet (existing structure or a new addition) to qualify for certification. Home builders desiring to certify a remodeling project should read the *Pima County Regional Green Remodeling Rating System* criteria and checklist to assess the appropriateness of their project. An initial orientation meeting with green building staff to review is strongly suggested to identify any special conditions or issues associated with the project. Once the residence is entered into the Green Remodeling Program, it will be tracked through the permitting and inspection process for credits.

Builders must satisfy all mandatory requirements listed for each category and submit appropriate documentation as noted to achieve certification. Certification confers the right for the builder/owner to advertise the home as a Pima County Regional Green Certified Remodel at the level of certification attained.

**SECTION 1: LOCATION, LOT DESIGN, PREPARATION & DEVELOPMENT**

***Individual Site Development & Amenities Criteria*** (typically only applicable to additions and/or renovations that also include exterior alterations and site improvements such as driveways, major landscaping or adding outdoor systems for renewable energy and water harvesting).

**Mandatory:** Control and direct runoff with straw bales, silt fencing, silt sacks, rock filters or other approved devices. Stabilize soils on slopes over 10% (slopes over 25% are not developable, slopes between 15-25% require special approval) with erosion control blankets or other approved methods.

**Mandatory:** Incorporate the Native Plant Preservation requirements into the Landscape Plan as required. An approved Native Plant Preservation Plan is required before a Landscape Plan can be approved. The Native Plant Preservation Ordinance (NPPO) requires that a plan be submitted whenever the area of grading for a project is at or exceeds 14,000 square feet and the total lot area is 36,000 square feet or greater, or when the subdivision plat requires it.

**Credit 1.1:** Minimize disturbed/compacted area of site to 15 feet around the perimeter of the building footprint and one driveway access area no wider than 15 feet. The limits of clearing and grading shall be clearly demarcated on the Site Plan, and the “No Disturbance” boundary flagged or fenced on site. (2 points);

**Credit 1.2:** For additions, provide a grading plan showing balanced cut and fill, maintaining original topography. (1 point);

**Credit 1.3:** Protect and maintain existing on-site native vegetation for a minimum of 75% of the “No Disturbance” area. Protection and maintenance may include watering, mulching, and protection of root system from compaction or trenching. (1 point);

**Credit 1.4:** Appropriate landscape plants for Pima County:

1.4.a. Use only drought-tolerant, low-water use plants for landscaping plantings *OR* if a rainwater harvesting system meeting the sizing requirements of Credit 4.1, 4.2 or 4.3 is installed, a combination of drought-tolerant plantings *and* food producing vegetation may be used. (2 points for either option);

1.4.b. Use only plants native to Pima County for landscape plantings; (1 additional point)

**Note:** A list of low-water use plants appropriate for Pima County is available at:

[www.azwater.gov](http://www.azwater.gov). A map of plant zones and list of plants native to Pima County is available at <http://www.pima.gov/cmo/sdcp/species/TRspeciesListing.html>.

**Credit 1.5:** Collect, conserve and protect topsoil on site for reuse. (1 point);

**Credit 1.6:** For new driveways, walkways, and patios: Install light colored, high albedo materials (minimum reflectance of 0.3) for:

1.6.a: at least 50% of the site’s new hardscape (2 points);

1.6.b: 100% of the site’s new hardscape (2 additional points);

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*Credit 1.7:* Fertilize all new landscaping with slow-release 100% organic fertilizer. (1 point);

*Credit 1.8:* Provide a recharge/retention plan for rainwater. Construct earth berms, gabions, pervious paving, swales or other appropriate stormwater control measures to reduce off-site runoff. (1 point).



## **SECTION 2: RESOURCE EFFICIENCY**

### **Building Assembly**

*Credit 2.1:* Advanced framing techniques, for use with remodeling projects that include new walls and room additions:

- 2.1.a: Use wood sheathing for shear walls only at areas required by the currently adopted International Residential Code. (0.5 point); *OR* use an alternative to wood sheathing for shear walls (entire building). (0.5 point);
- 2.1.b: Space joists greater than 16" o.c. (0.5 point);
- 2.1.c: Use stack-framing at joists and single top plates. (0.5 point);
- 2.1.d: Space studs at greater than 16" o.c. (additional 0.5 point);
- 2.1.e: Construct 2-stud corners. (0.5 point);
- 2.1.f: Construct insulated headers or box headers. (0.5 point);

*Advanced framing techniques can save up to 20% of the lumber used in a residential project with no reduction in structural integrity. In order to claim these credits, applicants should submit a complete set of framing plans with all header sizes. For more information, see:*

<http://www.nahbrc.org/greenguidelines/advancedframing.pdf>

<http://www.toolbase.org/PDF/DesignGuides/advancedwallframing1.pdf>

*Credit 2.2:* SIPs: For additions  $\geq 500$  square feet, use Structurally Insulated Panels for all wall and roof components wherever appropriate (2 points); *OR* Use an Insulated Concrete Form (ICF), insulated block system (i.e., Rastra, Mikey Block, Integra Block), (2 points); *OR* natural earthen masonry material (rammed earth, stabilized adobe) for all appropriate wall components (2 points);

*Credit 2.3:* Salvage and reuse original components of building such as cabinets, interior doors, trim and mouldings, flooring, structural lumber, and built-in furniture. A minimum of 40 square feet or 60 linear feet of each component must be salvaged to qualify (1 point per component, maximum 8 points);

*Credit 2.4:* Use salvaged building materials from other sources for building components such as cabinets, interior doors, trim and mouldings, structural lumber, and built-in furniture. A minimum of 40 square feet or 60 linear feet of each component must be salvaged to qualify (1 point per component, maximum 8 points);

### **Environmentally Preferable Products**

*Credit 2.5:* Use products certified as EPPs (Environmentally Preferable Products) *OR* as Indoor Advantage Gold certified. (0.5 point per component, maximum 8 points);

<http://www.scscertified.com/ecoproducts/indoorairquality/indooradvgold.html>

*Credit 2.6:* In lieu of EPP certification, the following material certifications may be *substituted* for the materials indicated:

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2.6.a: Carpet & Rug Institutes Green Label Plus certification *OR* SCS Sustainable Choice Certification for all carpets, adhesives and padding used in the residence. (0.5 point); *OR* **no** carpeting used in the remodeled parts of the residence. (1 point); <http://www.carpet-rug.org/residential-customers/selecting-the-right-carpet-or-rug/green-label.cfm>

2.6.b: Green Seal Certification for all interior paints, coatings, and enamels used in the residence. (1 point); *OR* Green Seal Certification for all interior *and* exterior paints, coatings and enamels used in the residence. (1 additional point); [http://www.greenseal.org/findaproduct/paints\\_coatings.cfm](http://www.greenseal.org/findaproduct/paints_coatings.cfm)

2.6.c: Use natural material as finish (no paints or coating). (1 point each for all new walls, new ceilings, new floors, new built-in features, maximum 3 points);

*Credit 2.7:* All adhesives and sealants introduced in the home are limited to the following VOC concentrations: (1 point total)

2.7. a.: Construction adhesives: the greater of 15% by weight or 200 grams/liter;

2.7.b: Sealants and caulks: the greater of 4% by weight or 60 grams/liter;

2.7.c: Contact adhesives: the greater of 80% by weight or 650 grams/liter;

*Credit 2.8:* All added wall and ceiling cavity/continuous insulation (minimum 500 sf used) is:

2.8.a: A bio-based foam product (i.e. soy). (1.5 points);

2.8.b: Recycled material (i.e. cotton, denim, cellulose). (1.5 points);

2.8.c: Formaldehyde-free fiberglass batts. (0.5 point);

*Credit 2.9:* All structural wood used in residence is FSC (Forest Stewardship Council) Certified Wood. (2 points); *OR* all wood (interior and exterior, including trim) is FSC Certified Wood. (2 additional points);

*The Forest Stewardship Council monitors and certifies lumber to standards for forest sustainability and stewardship. FSC certified wood is available from major retail building supply outlets. For more information see [www.fscus.org](http://www.fscus.org). Sustainable Forestry Initiative Certified wood can be substituted for FSC certification. [www.sfiprogram.org/](http://www.sfiprogram.org/)*

*Credit 2.10:* 100% of new flooring installed the residence is any combination of the following materials: cork, bamboo, reclaimed/recycled wood, reclaimed/recycled brick, sealed integral color concrete, or tile/flooring with a minimum 50% recycled content. (1.5 points);

*Credit 2.11:* All installed cabinetry and built-ins are made from materials that contain no urea formaldehyde resins. (1 point);

*Credit 2.12:* Use products with a minimum recycled content:



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2.12.a: Minimum 25% pre-consumer (industrial or manufacturing process) recycled content for countertops, flooring, or wall components. (0.5 point per component); *OR*

2.12.b: Use products with a minimum of 25-49% post-consumer recycled content for countertops, flooring, or wall components. (1 point per component); *OR*

2.12.c: Use products containing 50% or more post-consumer recycled content for countertops, flooring, or wall components. (2 points per component);

*Credit 2.13:* Upgrade the HVAC system to a system that does not use refrigerants or uses non-HCFC refrigerants. (1 point);

Hydrochlorofluorocarbons (HCFCs) are known to contribute to the depletion of the ozone layer, and will be phased out by 2010. For information on alternatives to HCFCs, see <http://www.hrai.ca/hcfcphaseout/index.html>

*Credit 2.14:* If not already installed, provide an area for recycling with bins inside the house. (1 point);

### **Regionally Extracted and Manufactured Products**

Credit 2.15:

2.15.a: At least 20% of construction materials used, by weight or volume, are extracted and manufactured from within a 500 mile radius of the building site (2 points); *OR*

2.15.b: 50% of construction materials, by weight or volume, are extracted and manufactured from within a 500 mile radius of the building site (2 additional points);

2.15.c: For projects involving new pathways, driveways or sidewalks, use exterior paving materials from within a 100-mile radius of the building site. (1 point);

*Regionally extracted and manufactured materials use less fossil fuel for transport and support the local economy. Builder shall document that the material was harvested and processed within a 500 mile radius of the building site. If the material contains a minimum of 25% recycled content and is regionally manufactured, the credit may still be taken even if the material is collected outside the 500 mile radius.*

### **Construction Waste Management**

Credit 2.16.a: Reduce construction waste to 25% less than industry average. (3 points);

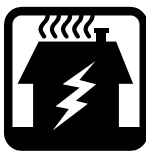
Credit 2.16.b: Reduce construction waste to 50% less than industry average (3 additional points);

Credit 2.16.c: Reduce construction waste to 90% less than industry average (2 additional points).

*The National Association of Home Builders Research Center data indicates the industry averages 4.2 lbs (.0265 cubic yards) of waste per square foot of conditioned space. To achieve this credit, multiply the conditioned space square footage by 4.2 to get the average waste for the size of the residence. A Remodeling Waste Management calculator is available on our web site.*

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*Demonstrate a minimum 25% reduction through submittal of a waste management plan documenting the amount of waste diverted through reduction, recycling, reuse, salvage or donation of excess materials to a non-profit organization. Land clearing waste and demolition waste from removal of pre-existing structures does not count towards the totals.*



### **SECTION 3: ENERGY EFFICIENCY**

For additional information on Energy Efficiency measures that can be achieved during remodeling see: [http://www.toolbase.org/PDF/DesignGuides/All\\_Modules\\_small.pdf](http://www.toolbase.org/PDF/DesignGuides/All_Modules_small.pdf)

#### **BUILDING DESIGN & ORIENTATION**

**Mandatory:** If replacing the HVAC system, size the new system properly according to heating and cooling loads calculated using ACCA 556 (Manual J) or equivalent.

**Mandatory:** Size and install all new ductwork properly according to ACCA 29-D (Manual D) or equivalent. Seal all ductwork with tape or water-based mastic.

**Mandatory:** Install an Energy Star rated programmable thermostat.

**Mandatory:** Seal off entire duct system during construction or clean all ducts and HVAC equipment following construction completion.

**Mandatory:** If radiant or hydronic space heating systems are utilized, the system shall be designed using Gas Appliance Manufacturer's Association GAMA-H-22 guidelines, See <http://www.gamanet.org> , Radiant Panel Association (RPA) *Guidelines*, [www.radiantpanelassociation.org](http://www.radiantpanelassociation.org) or by an accredited design professional in accordance with manufacturer's recommendations.

**Credit 3.1:** Provide shading devices or overhangs for all south-facing fenestration such that the fenestration is fully shaded at noon during the months of June, July and August. (2 points); for proper sizing information see: <http://www.azsolarcenter.com/design/pas-3.html>

**Credit 3.2:** If replacing windows, install appropriate glazing type for each orientation to maximize solar gain and visibility but reduce overheating. (2 points);

*For information on appropriate glazing types for passive solar heating see:*  
<http://www.nrel.gov/docs/fy01osti/27954.pdf>

**Credit 3.3:** Plant two drought-tolerant trees, (preferably native) minimum 10' height, on the east or west side of the residence as close to the residence as possible without causing future root damage to structure. (1 point per tree; max. 3 points);

*For information on tree placement benefits see:*  
<http://www.epa.gov/heatisland/strategies/vegetation.html>

**Credit 3.4:** Install window treatments ("solar shades" or similar products) with an openness factor of 8% or less on 50% of all east, west and south facing windows (1 point); *OR* 100% of all east, west and south facing windows (1 additional point);

*Openness Factor" - (O.F.) Refers to the ratio of open area to the total flat surface area of a drapery fabric or perforated material. This quantity relates well to the amount of solar heat*

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*admitted through a fabric or perforated material to the extent to which discomfort results to individuals near the glazing system.*

*Credit 3.5:* Install a whole house fan to ventilate residence with outside air. (1 point);

*Credit 3.6:* Install lighting and ceiling fans in accordance with the Energy Star Advanced Lighting Package (ALP) criteria. (2 points);

[http://www.energystar.gov/index.cfm?c=fixtures.alp\\_consumers](http://www.energystar.gov/index.cfm?c=fixtures.alp_consumers)

*Credit 3.7:* Install tubular skylights for illumination of interior spaces (0.5 point per skylight, max. 2 points);

*Credit 3.8:* Install a Heat Recovery Ventilation (HRV) or an Energy Recovery Ventilation (ERV) system to condition incoming outside air. (2 points);

*Credit 3.9:* Install a passive solar ventilation air preheating system. (1 point);

<http://www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=773>

*Credit 3.10:* Insulate all new hot water lines to a minimum of R-4. (1 point);

*Credit 3.11:* Provide a plumbing line stub out to a south facing roof for future solar thermal installation. (1 point);

*Credit 3.12:* Install a solar thermal hot water system to provide a minimum of 60% of the estimated annual load (the “Solar Fraction”). (2 points); OR 100% of the estimated annual load. (3 points);

*Credit 3.13:* Provide electrical conduit from service panel to flat or south-sloping roof surface area for future solar PV system. (1 point);

*Credit 3.14:* Install a solar PV system (grid tied or off grid) to generate on-site electricity. (1 point for each 10% of annual electrical load);

*Credit 3.15:* Provide a minimum 15 ft of permanent or retractable outdoor clothesline, *OR* an installed drying rack in the laundry room. (1 point);

*Credit 3.16:* Replace or install window with an Energy Star rating or equivalent. (0.5 point per window);

*ENERGY STAR rated windows are dual-pane, Low E coated glass with thermally broken panes, and have a maximum SHGC (Solar Heat Gain Coefficient) of 0.4 and, a maximum U-factor of .40. Skylights have a maximum SHGC of .40 and a maximum U-factor of .60. These features save energy by reducing heat flow and glare. See [www.Energystar.gov](http://www.Energystar.gov)*

*Credit 3.17:* All new insulation shall be installed to achieve “Grade 1” certification; regardless of the insulation material or installation process. (0.5 point per 500 sq. ft., maximum 2 points);

See <http://www.getenergysmart.org/Files/InsulationAssessment.doc>

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*Credit 3.18:* Use blown-in or foam insulation at walls and ceilings. (0.5 point per 500 sq. ft., maximum 2 points);

*Credit 3.19:* Locate all new ducts within conditioned building space. (1 point);

*Credit 3.20:* Install air handling systems, furnaces, and water heaters in conditioned space. (1 point);

*Credit 3.21:* When re-roofing or roofing an addition, install an Energy Star or Cool Roof Rating Council certified roofing system. (2 points);

*For information on Energy Star Roofing and the Cool Roof Rating System see:*

[http://www.energystar.gov/index.cfm?c=roof\\_prods.pr\\_roof\\_products](http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products) or

<http://www.coolroofs.org/>

*Credit 3.22:* Install a water recirculating, high efficiency evaporative cooler, with timer ejector system plumbed for landscape irrigation. (1 point); *OR*

*Credit 3.23:* Cooling system is an electric heat pump with multi-speed compressor and variable speed air handling units. (2 points); *OR*

*Credit 3.24:* Cooling system is a hydronic radiant system *OR* a ground-source heat pump. (3 points);

*Credit 3.25:* Insulate the attic access opening to the same value as the ceiling insulation *OR* design for no attic access. (0.5 point);

*Credit 3.26:* Install only Energy Star rated appliances. (1 point per appliance type; max. 4 points);

*Credit 3.27:* Install a furnace with an ENERGY STAR™ rating. (1 point).



## **SECTION 4: WATER EFFICIENCY**

### **Rainwater Harvesting**

*Credit 4.1:* Install a rainwater harvesting system capable of retaining and storing 50% or more of the average annual available rainfall on the catchment surface (minimum catchment area = 500 ft.). (6 points);

*Credit 4.2:* Install a rainwater harvesting system capable of retaining and storing 25% of the average annual available rainfall on the catchments surface (minimum catchment area = 500 ft.). (4 points);

*Credit 4.3:* Install a rainwater harvesting system capable of retaining and storing 10% of the average annual available rainfall on the catchments surface (minimum catchment area = 500 ft.). (2 points);

*Most rainwater harvesting systems include a catchment surface, gutters w/ filtered downspouts, underground or above ground storage tank, and drip irrigation system for disbursing the harvested water on the landscape as needed. Annual rainfall for Pima County varies from under 11 to over 14". For the purposes of estimation, an annual rainfall of 12.3" may be used. You may use the [rainwater harvesting calculator](#) to compute the size of the storage tank needed.*

*For more information on the design of rainwater harvesting systems follow these links:*

<http://ag.arizona.edu/pubs/water/az1052/>

<http://www.harvestingrainwater.com>

*Credit 4.4:* Install a gutter and downspout system or canales that tie to storm water infiltration trenches, bioswales, or rain gardens. (0.5 point per downspout, max 2 points);

### **Greywater Reuse**

*Credit 4.5:* Install separate greywater and sanitary sewer lines on residences with greywater lines stubbed out to exterior and clearly marked. (1 point);

*Credit 4.6:* Install greywater lines as above, *and also* connect the greywater lines to a harvesting system with drip irrigation system serving landscaping. (2 additional points);

*For more information on the legal uses of greywater and best management practices in Arizona follow this link:*

<http://www.azdeq.gov/envIRON/water/permits/download/graybro.pdf>

*Greywater and Rainwater Harvesting Tax Credits in Arizona Effective January 1, 2007, Arizona taxpayers who install a "water conservation system" (defined as a system to collect rainwater or residential greywater) in their residence may take a one-time tax credit of 25% of the cost of the system (up to a maximum of \$1,000). Builders are eligible for an income tax credit of up to \$200 per residence unit constructed with a water conservation system*

*installed. At the moment only greywater-harvesting systems qualify for the credit, but State legislators are planning to remedy this in the near future so rainwater-harvesting systems will also qualify. For application forms and further information go to: [www.azdor.gov](http://www.azdor.gov) click on “credit pre-certification” on the left hand side of the home page click on “gray water conservation tax credit.” There is general information and applications for corporations and for individuals.*

**Plumbing, Appliances & Fixtures**

If re-plumbing during a kitchen/bath remodel, or adding new plumbing to an addition:

*Credit 4.7:* Install a “central-core” plumbing system with all water-using fixture fittings within five feet of the hot water heater. (1 point);

*Credit 4.8:* Install a manifold controlled “home run” water distribution system. Fixtures shall be located within 10 feet of the circulation loop with branch lines no greater than 0.5” in diameter. (2 points);

*Credit 4.9:* Install a manual or motion activated on-demand hot water circulation pumping system. (*note: continuous recirculation systems do not qualify*). (2 points);

*Credit 4.10:* Install a point-of-use tankless hot water heater that uses only cold water supply or solar-assisted preheating for any fixture greater than 20 pipe run feet from water heater. (1 point per fixture; maximum 3 points);

*Credit 4.11:* Install lavatory faucets that meet the proposed EPA’s WaterSense™ criteria or have a maximum flow rate of 1.5 gpm or less. (1 point each faucet, maximum 3 pts);

*Credit 4.12:* Install showerheads that meet the proposed EPA’s WaterSense™ criteria or have a maximum flow rate of 1.5 gpm @ 80 psi. (1 point per fixture; maximum 3 points);

*Credit 4.13:* Install toilets that meet the EPA’s WaterSense™ rating (1.28 gpf) (1 point per fixture, maximum 3 points);

*Credit 4.14:* Install dual flush toilets with 1.6/8 gpf or less water use. (1.5 points per fixture, maximum 3 points);

*Credit 4.15:* Install a washing machine with a water factor of 6.0 or less (2 points);

*Credit 4.16:* Install a composting toilet. (2 points per fixture, no maximum);

*Credit 4.17:* Install a refrigerator with an in-door filtered water system. (0.5 point);

*Credit 4.18:* Install excess flow check valves or excess water shutoff connectors at fixtures. (0.5 point per fixture, maximum 3 points);

*Credit 4.19:* No garbage disposal. (1 point);

**Irrigation Systems**

*Credit 4.20:* Install landscaping designed by a licensed landscape professional using drought-tolerant plantings that require no irrigation. (2 points);

*Credit 4.21:* Irrigation system is designed and installed by an EPA Watersense™ certified landscaping professional. (2 points);

*For more information on EPA Watersense™ certification, follow this link:*

<http://www.epa.gov/watersense/pp/irrprof.htm>

*Credit 4.22:* Install a high efficiency irrigation system that uses: (0.5 point for each item);

4.22.a: “Smart Controllers” with moisture sensors, rain delay controllers, and high efficiency nozzles;

4.22.b: Check valves in heads and heads matched to the beds distinct watering needs;

4.22.c: Separate sprinkler zones for beds, with plants grouped based on watering needs (hydrozoning);

4.22.d: A timer/controller that irrigates during the hours of 10 pm to 8 am to minimize losses from evaporation;

4.22.e: Drip irrigation for all planting beds.

*Note: See the Site Development Section for related criteria.*





**SECTION 5: INDOOR ENVIRONMENTAL QUALITY**

*Credit 5.1:* If a garage is added or already present, provide a 100 cfm exhaust fan with operation controlled by an occupant sensor, garage door opening/closing device, or timer. Provide outside make-up air through a screened inlet. (1 point);

*Credit 5.2:* Complete the requirements for the EPA's Energy Star Indoor Air Quality Package certification. (3 points);

*Credit 5.3:* Test for radon and if the radon level is 2 pCi/L (pico Curies per Liter) or more, install a radon ventilation system (or other recommended system) and seal cracks and holes in foundation/slab. (1 point); See <http://www.epa.gov/radon/index.html>

*Credit 5.3:* Install only combustion sealed furnaces, fireplaces and water heaters in residence. (0.5 point);

*Credit 5.4:* Install a whole house filtration system with a MERV rating of at least 11. (1 point);

*Credit 5.5:* Vent remote exhaust systems in kitchens and bathrooms directly to the outside. (0.5 point per fan, max. 2 points);

*Credit 5.6:* Perform a post-construction, pre-occupancy flush by keeping windows open and the HVAC system fan running continuously for one week. Replace air filter upon completion of flushing period. (1 point).



**SECTION 6: OPERATION, MAINTENANCE, & BUILDING OWNER  
EDUCATION**

*Credit 6.1:* Provide an informational package to homeowners including a description of all features and systems, maintenance manual describing and illustrating the care and maintenance the homeowner should perform on all features and systems to keep them operating properly, a list of service providers/equipment suppliers for all features, and any other appropriate materials for the construction and system type. The manual shall also outline ongoing service and care of common open space, retention/detention basins, wildlife corridors, and environmental management areas as appropriate. (2 points);

**Innovation Points**

*The field of green building and sustainable residential design continues to evolve as experience and insight into the best possible practices for delivering high quality green products increases. The Green Building Program encourages applicants to pursue credit for noteworthy achievements in performance; design and construction. Innovation points are available in every category for green building measures and methods that result in superior performance, efficiency, cost reduction or environmental benefits. Points are awarded based on the individual measure's difficulty of implementation and level of impact, and typically range from 0.5 to 5 points.*