

*Case Studies*

# NJ **GREEN** HOME REMODELING GUIDELINES





## Use of the Guidelines

*What are the guidelines and what are they not?*

The information provided in these guidelines is intended to assist homeowners, contractors, architects, interior designers, landscape architects, and other professionals who design and remodel residential structures. They draw upon best practices and provide a general overview of green remodeling strategies customized for New Jersey, with links to additional information and resources. These guidelines introduce ways a homeowner or remodeling professional can incorporate green building practices into common home remodeling projects. These are not step-by-step technical guides but rather a menu of ‘best practices’ organized by major building systems. One should become familiar with local building code and zoning requirements before undertaking a green home remodeling project.

The guidelines do not list or endorse specific green products or services but rather identify ‘greener’ options to consider when selecting materials and services for the home.

These Guidelines do not constitute an endorsement, approval, or recommendation of any kind by any persons or organizations affiliated with developing these Guidelines. The NJDEP further disclaims any and all liability for any personal injury, property damage or any other damages that are caused by or that may result from the reliance on these NJ Green Home Remodeling Guidelines.

### **New Jersey Green Home Remodeling Guidelines Version 1.0**

Copyright © 2009 Rutgers Center for Green Building.

Cover Images: Michael Fleischacker, Ford 3 Architects, Barbara Geller, Patricia Gaylor, John D. S. Hatch, Ed Schwartz

# Acknowledgments

The *New Jersey Green Home Remodeling Guidelines (NJGHRG) Version 1.0* is funded by the New Jersey Department of Environmental Protection (NJDEP). Special thanks to Martin Rosen, NJDEP Office of Planning and Sustainable Communities, for his role as project manager.

The development of *NJGHRG Version 1.0* has been managed by the Rutgers Center for Green Building and has included review and suggestions by an Expert Advisory Group comprised of residential building and remodeling professionals, interior designers, landscape architects, and experts in the field of green building and energy-efficient design.

Special thanks to the many individuals for contributing to the development of *NJGHRG Version 1.0*:



## Project Team:

Rutgers Center for Green Building  
Edward J. Bloustein School of Planning and Public Policy  
Rutgers, The State University of New Jersey  
33 Livingston Avenue  
New Brunswick, New Jersey 08901  
[www.greenbuilding.rutgers.edu](http://www.greenbuilding.rutgers.edu)

**RUTGERS**  
**Center for**  
**GREENBUILDING**

Jennifer Senick, *Executive Director*  
Maren Haus, *Research Project Manager*  
Dr. Clint Andrews, *Director*  
Dr. Judy Shaw, *Research Associate*  
Jerry Flach, *Research Assistant*  
Eric Tuvel, *Research Assistant, Graphic Designer*  
Mark Bolen, *Research Assistant*  
Pinky Samat, *Research Architect*  
Brian M. Koczan, *Research Architect*  
Thomas Behrens, *Research Intern*

## Expert Advisory Group:

Michael Brown, *Director, Program Services, MaGrann Associates*  
Christine Bruncati, *Senior Research Architect, Center for Building Knowledge, New Jersey Institute of Technology*  
David E. Cohen, *Principal, DEC Architect*  
Edward Conn, *Senior Associate, Chu & Gassman Consulting Engineers*  
Jeff Crum, *Vice President of Real Estate Development, Real Estate Advisory and Development Services (READS)*  
R. James Del Grosso, *President, Residential Energy Professionals, LLC*  
Julie Deseve, *Program Manager, Conservation Services Group*  
Ron Emrich, *Executive Director, Preservation New Jersey*  
David Fredericks, *Department Head – Electrical, Chu & Gassman Consulting Engineers*  
Suzan Globus, *Principal, Globus Design Associates*  
Seiko Goto, *Assistant Professor, Landscape Architecture, Rutgers University*

Bill Hlubik, *County Extension Department Head and Director, Middlesex County Earth Center, Rutgers, New Jersey Agriculture Experiment Station*  
Walter Kanzler, *Principal, Eco Collaborative, LLC*  
Dr. Richard Lynch, *President, Environmental Safety Management Corporation*  
Mark MaGrann, *Chairman and Founder, MaGrann Associates*  
Mona Mosser, *Bureau Chief, New Jersey Board of Public Utilities*  
Robert Politzer, *President, Greenstreet Construction, Inc.*  
Linda Lee Potter, *Principal, Linda Lee Potter Designs, LLC*  
Lisa Strovinsky, *President, Allentown Garden Club*  
Andrew Topinka, *President and Founder, Technical Group Services, Inc.*  
Thomas G. Wells, *President, Thomas G. Wells Construction, LLC*  
Robert E. Wisniewski, *Lincoln Park Coast Cultural District*  
David Wolk, *Residential Programs Manager, New Jersey's Clean Energy Program™*

## Case study contributors:

### Professionals:

Atlantis Historic Properties  
Robert J. Brander, Inc.  
Kristen Bouterse, *Paints Plus*  
Emily K. Buehrle, *EKB Designs*  
John Thomas Collins, *AIA*  
Conservation Development, LLC  
Jerri Eskow, *Iron Gate Interiors*  
Entasis Architecture, LLC  
Fiedler Designs, LLC  
Michael Fleischacker, *CLA, ASLA, LEED AP, Back to Nature*  
Gaia Gardens  
Patricia Gaylor, *Eco-Interiors by Patricia Gaylor*  
Barbara Geller, *GardensByBarbara*  
Jacqueline Germany, *Nina's Nuances Interior Design, Inc.*  
Green Living Solutions  
Greenpath Organic Landcare  
GreenStreet Construction and GreenStreet Energies  
Anna Hackman, *Green Building Consultant*  
John D. S. Hatch, *AIA; Clarke Caton Hintz*  
W. David Henderson, *R.A., HHG Development, LLC*  
Hiland Hall Turner, *Hiland Hall Turner Architects*  
Isles Inc.  
Rees Keck, *GreenStreet Construction*  
Lori Jacobsen, *Lori Jacobsen Design, LLC*  
Sherrie Legro Round, *Enchantment Lives*  
John Marinaccio Construction  
Moiria McClintoc, *AIA, Ford3 Architects*  
Danielle Ann Millican, *Danielle Ann Millican, Inc.*  
Robert Mitchell, *General Contractor*  
Kim Nadel, *Niche Interior Design*  
Robert Nagy Building Company  
Omega Corporation

Marisa Pellegrini, *Photography by www.marisapellegrini.com*

Joan Picone, *Joan Picone, Inc.*  
Roger Polo, *Polo Master Builders*  
Lyle Rawlings, *Advanced Solar Products, Inc.*  
Frank Russo, *AIA, Shapiro Petruskas Gelber*  
Peter Salerno, *Peter Salerno Inc.*  
Brian and Janet Siegel, *Siegel Architects*  
Andy Shapiro, *Vermont Energy Investment Corporation*  
Paul W. Steinbeiser, Inc.  
Richard Stryker Contracting  
Tara Construction Management Corp.  
Norton Thompson, *Tremor Contracting*  
Thomas G Wells Construction, LLC  
Jane Wilson, *AIA, Ford3 Architects*  
Woodhaus Construction  
Jordan Valdina, *AIA*  
Tom Vierschilling *LEED AP, WESKetch Architecture*

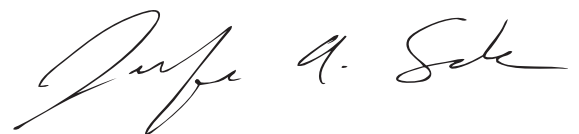
### Homeowners:

Ken and Kathy Abbott  
Janet Black  
Robert Brander and Lise Thompson  
Stephen and Barbara Fiedler  
The Fortnightly Club of Summit  
Richard and Barbara Geller  
James and Barbara Hanson  
John Hatch and David Henderson  
Deborah Monroe  
Parkland Properties, LP and Thomas G. Wells  
Jeff and Amy Plaut  
Mr. and Mrs. Ryan Quinn  
Ed Schwartz and Julie Tung  
Randall Solomon and Rebecca Hersh

## REGREEN ASID & USGBC

In addition, we would like to acknowledge the U.S. Green Building Council (USGBC) and the American Society of Interior Designers (ASID) for their support and permission to utilize strategy IDs from the REGREEN Residential Remodeling Guidelines 2008.

## RUTGERS Center for GREENBUILDING



Jennifer Senick  
Executive Director  
Rutgers Center for Green Building



A photograph of a stone path winding through a lush garden. The path is made of large, flat, light-colored stones set in a meandering pattern. The garden is filled with various green plants, including ferns and leafy shrubs. In the background, several trees with green foliage stand tall. Sunlight filters through the leaves, creating dappled shadows on the path and surrounding vegetation. The overall scene is peaceful and natural.

Transforming the conventional lawn into green outdoor living space complements the home and connects it with nature. New Jersey, with long summer days and cool autumn evenings, provides a perfect environment for outdoor living. As the primary connection to our natural surroundings, yards function as a beautiful, livable extension of the home. Whether planning your own outdoor project or hiring a professional, there are dozens of ways to implement renewable products, conserve resources, promote biodiversity and wildlife habitat, and reduce home heating, cooling, and water usage.

## Outdoor Living and Landscaping

Photo: Michael Fleischacker



# Case Study



**Location of Project:** Bernardsville, New Jersey

**Landscape Architect:** Michael Fleischacker CLA, ASLA, LEED AP

**General Contractor:** Back to Nature

reliance on purchased produce, transportation energy savings and a greatly expanded living space.

## Lessons and Trade-offs

The landscape architect points out that there are always surprises in the construction industry; it is a matter of recognizing that fact and anticipating as many of the surprises as you can up front. Having said that, he did not think he would have done anything differently. One thing that this project taught him was that the entire process must be flexible and evolve the same way that the stakeholders and the site do. The world is constantly changing, and so all projects must evolve with it.

*"The most rewarding aspect of this project is the relationships I have found myself in with the clients and the other professionals that have had a stake in this regenerative residence."*

**- Michael Fleischacker**

## Overview and Scope

This project involved a home converted from stables located on a six-acre property. The homeowners approached Back to Nature in 2002 to help transform the outdoor spaces surrounding the home to be in tune with their organic, nature-loving, and family-oriented lifestyle. The project incorporated several environmentally-conscious strategies, and the outdoor spaces continue to develop as a reflection of the clients' green lifestyle.

## Design Approach

The original goal of this project was to create a series of outdoor rooms that would "unfold" in a way similar to the indoor rooms of a home. The project started with a site master plan that evaluated the barriers between indoors and out. Over the next seven years, the landscape architect continued working with the client as the project evolved in the areas of growing organic food, restoring native habitats, integrating alternative energies and stormwater retention practices, promoting a healthy and inviting atmosphere for family and friends, and connecting the homeowners with their land.

## Team and Process

An integrated design process has played a value-adding role in realizing the potential of this project. Over the course of this outdoor remodel, stakeholders have included the clients, the landscape architect, architects, contractors from all trades, engineers, arborists, organic consultants, apiary specialists, forest managers, municipal agents, and neighbors.

## Finance

Costs are an important consideration for all projects. This venture was no different as costs were woven into the fabric of the project. The project team anticipated and realized both tangible and intangible returns on the investments into this project including a decreased



Streetside garden



Organic garden



Compost bins



# List of Green Strategies

## Native Restoration

- Converted lawn to birch grove garden, woodland gardens, and native stone terraces
- Removed invasive species and reintroduced **native species** to woodland ground covers and understory
- Removed stilt grass and lawn from septic field area and reseeded with native prairie mix

## Growing organic food and flowers

- Planted peach, pear, and apple trees in orchard
- Created a part-shade herb and vegetable garden with plants selected for their historic medicinal and food value
- Incorporated raised garden beds and a kitchen/cutting garden that expanded significantly the farming capabilities of the property
- Incorporated cold frames to extend the growing seasons and provide a controlled environment for drying fruit, herbs, and vegetables
- Created compost bins from cedar logs, allowing for 100 percent of biodegradable waste to remain on-site and be reintroduced as compost soil in the garden beds
- Built a corn crib-inspired wood shed used to split and store wood harvested from dead or fallen trees, which then are used in wood burning stoves as alternative heating for the residence and ancillary structures
- Created an apiary garden with a beehive that produces fresh honey for a variety of family uses while adding value to the gardens through pollination
- Proposed future projects, including a “green” greenhouse and free range chicken



New pavillion

## Other Green Strategies

- Installed low voltage landscape lighting
- Planted edible “living” holiday trees for wildlife habitat and food throughout the winter
- Utilized regional materials and contractors for all aspects of this project.
- Installed an outdoor kitchen
- Proposed **photovoltaic** array, salt water spa, and solar energy for water heating



Kitchen garden



Before



After



# Case Study



**Location of Project:** Bucks County, PA

**Homeowners:** Richard and Barbara Geller

**Architect:** Moira McClintock, Jane Wilson, Ford3 Architects

**General Contractor:** Robert Mitchell

**Landscape Architect:** Barbara Geller, Landscape Designer, GardensByBarbara

**Area Affected:** Approximately 600 square feet

## Overview and Scope

The project was a new 'garden room' addition to a historical 18th century bank barn that was converted into a home in the 1970's. The owners wanted to have the addition integrate with both the existing living space and the surrounding landscape, using similar materials and repeating design elements. The room was intended to expand the size of the indoor living area yet convey the feeling of being outdoors and close to nature.

Since the owner is a landscape designer and believes in advancing ecological goals, the possibility of incorporating a vegetative **green roof** was seriously considered during design discussions.

## Design Approach

The architects are committed to green solutions and implement both active and passive sustainable technologies in their projects. They encouraged exploration and had access to knowledgeable local contacts.

The owner was particularly attracted to the aesthetics and ecological advantages of using a **green roof**. In addition, she was open to using other green technologies, if cost effective.

## Team and Process

The homeowners and designers each had a general orientation to green solutions. The architects, in particular, had many successful green project implementations. The building contractor had many years of experience working in the Bucks County area and had previously done work for the owners. He, however, had no experience with green technologies. For the **green roof** installation,

he worked closely with the **green roof** suppliers to make sure all components were correctly installed. Over time, he became very committed to the project and felt a genuine pride and enthusiasm in his contribution.

## Finance

Since the actual size of the **green roof** was relatively small (approximately 250 square feet), the added cost of a **green roof** was not as much of an issue as it would have been for a larger area. The owner/landscape designer was committed to doing a **green roof**; the additional cost was not an issue.

The owner is a recent graduate of the NY Botanical Garden in Landscape Design and had many contacts at the school for suppliers of **green roof** materials. She acquired estimates for building the **green roof** from several of these established **green roof** supplier/builder teams prior to actually selecting the supplier and builder. When a builder the owner had previously used said he would come out of retirement and travel up from Florida to do the project, the owners decided it was an offer too good to refuse. The actual cost incurred by purchasing the supplies directly from a **green roof** supplier and using the owners' contractor was approximately 10 percent less than working with an established supplier/builder team. The cost of the **green roof** was approximately 15 percent more than a high quality copper standing seam roof which would have been the alternate choice.

The owner anticipates a lower cost for heating and air conditioning as a result of installing a **green roof** and having good cross ventilation compared to a more traditional roof. The savings, however, are difficult to quantify since the room has only existed with a **green roof** and there would be no other comparable experience.

## Lessons and Trade-offs

There were no serious surprises with this project. The roof was designed and built in an arched form to match the surrounding landscape. The construction work involved in implementing the roof curve was more than anticipated and added to the complexity of installing the **green roof** components.

Serious planning was required to determine the plants for the **green roof**. The site is only sunny for about a third of the day, so sedum plants, which are traditionally used for **green roofs** and thrive in the hot, dry sun, were not an option. Instead, the landscape designer decided to use a palette of low-maintenance, drought-tolerant, ground cover plants with various leaf textures and flowering times. The plants were installed in late August 2008 and have thrived in the special **green roof** growing media. It is anticipated that some supplemental watering will be required for the first year or two until the plants are well established. This plant palette also required a media depth of 4 - 5 inches. The structural engineer needed to take into account this additional roof load when specifying the **glulam** support beams.

In the opinion of the landscape designer and owner, the combination of the aesthetics of a **green roof** and its ecological advantages make it an obvious solution for anyone who is interested in the environment and has an appreciation of nature.



*"I felt the project was a great example of collaboration and synergy between the architects, builder and owner. Each provided their own particular expertise and worked collaboratively with the others, presenting ideas and brainstorming solutions. The final result is terrific."*

*- Barbara Geller, owner/landscape designer*

## List of Green Strategies

### Energy Conservation

- Installed **green roof** to reduce **heating and cooling load**
- Incorporated cross ventilation into window design to reduce cooling load
- Installed **roof overhang** to reduce summer heat gain and increase winter **passive heat** gain from the sun
- Installed radiant floor heating
- Increased roof insulation **R-Value** by using foam insulation

### Water Conservation

- Reduced stormwater **runoff** by installing **green roof**

### Resource Conservation

- Reused Bucks County field stone from an abandoned stone wall found up the road from new structure

### Outdoor Air Quality

- Increased carbon dioxide absorption and oxygen emission from the **green roof** plant photosynthesis



Green roof over new addition



Before



After



## Photography Credits

### Cover

Top left: John D.S. Hatch, Trenton Row House Case Study  
Top right: Michael Fleischacker, Hanson Case Study  
Below top right: Ed Schwartz, Schwartz Case Study  
Bottom left (top): Patricia Gaylor, Abbott Case Study  
Bottom left (bottom): Ford3 Architects and Barbara Geller, Geller Case Study  
Bottom right: John D.S. Hatch, Trenton Row House Case Study

### Kitchen, Bath and Living Spaces

Cover: Patricia Gaylor, Abbott Case Study  
Case Study 1: Jacqueline Germany, Montclair Casew Study  
Case Study 2: Lori Jacobsen, Quinn Case Study  
Case Study 3: Randall Solomon, Solomon Case Study  
Case Study 4: Patricia Gaylor, Abbott Case Study  
Case Study 5: Patricia Gaylor, Collins Case Study  
Case Study 6: Stephen Fiedler, Fiedler Case Study  
Case Study 7: Photography by www.marisapellegrini, Twin Maples Case Study

### Finished Basement and Major Addition

Cover: Lise Thompson, James Dean House Case Study  
Case Study 1: Ed Schwartz, Ridgewood Case Study  
Case Study 2: Deborah Monroe, Monroe Case Study  
Case Study 3: Tom Verschilling, Greendale Case Study  
Case Study 4: Lise Thompson, James Dean House Case Study

### Weatherization and Energy

Cover: John D.S. Hatch, Trenton Row House Case Study  
Case Study 1: Thomas G. Wells, Parkland Properties Case Study  
Case Study 2: John D.S. Hatch, Trenton Row House Case Study  
Case Study 3: GreenStreet Energies, Black Case Study  
Case Study 4: Darren Port, Bellvue Court Case Study

### Outdoor Living and Landscaping

Cover: Michael Fleischacker, Hanson Case Study  
Case Study 1: Michael Fleischacker, Hanson Case Study  
Case Study 2: Ford3 Architects and Barbara Geller, Geller Case Study

### Back Cover

Left: Photography by www.marisapellegrini, Twin Maples Case Study  
Middle: Lise Thompson, James Dean House Case Study  
Right: Patricia Gaylor, Collins Case Study



## Rutgers Center for Green Building [RCGB]

The Rutgers Center for Green Building is located at the Edward J. Bloustein School of Planning and Public Policy, Rutgers, The State University of New Jersey. The Center forms a common umbrella for existing and proposed initiatives being carried out through separate Centers at the Bloustein School, the School of Environmental and Biological Sciences (formerly Cook College), the School of Engineering and other Rutgers units that are integral to developing and implementing innovative green building strategies.

The Rutgers Center for Green Building has developed capabilities in applied green building research that entail modeling the life cycle cost and environmental impact of buildings, post occupancy study tools including survey research and building operating data analysis, and financial methodologies to better estimate green building value. The Center has produced a series of reports documenting best practices in green building and regularly provides green building training and education modules for a variety of audiences.

# RUTGERS Center for GREENBUILDING

Rutgers Center for Green Building

Edward J. Bloustein School of Planning and Public Policy

Rutgers, The State University of New Jersey

33 Livingston Avenue

New Brunswick, New Jersey, 08901

Phone [732] 932 4101, ext 520

Fax [732] 932 0934

[www.greenbuilding.rutgers.edu](http://www.greenbuilding.rutgers.edu)



The development of the New Jersey Green Home Remodeling Guidelines (NJGHRG) Version 1.0 was funded by the New Jersey Department of Environmental Protection (NJDEP) and the U.S. Environmental Protection Agency (USEPA), who contributed a grant for workshops and other marketing activities.

The Rutgers Center for Green Building developed the guidelines with extensive input and review by an expert advisory group comprised of residential building and remodeling professionals, interior designers, landscape architects, and experts in the field of green building and energy-efficient design.



[www.state.nj.us/dep/](http://www.state.nj.us/dep/)



[www.epa.gov](http://www.epa.gov)

**RUTGERS**  
**Center for**  
**GREENBUILDING**  
[www.greenbuilding.rutgers.edu](http://www.greenbuilding.rutgers.edu)