

## GREEN BUILDING

*Case Study 2009-2010: Woodhill Residence on Bundoran Farm, North Garden, Virginia  
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### WHY

"Common sense refined" (Grady Lewis). Awareness, respect and concern for the health and viability of our natural environment and our place in it. From this comes the philosophy of low impact development (LID) and sustainability which means maintaining and protecting our natural environment's space, water, air, natural resources and energy by minimizing uses while designing and building to last. We selected our architect and builder largely for their green philosophy and experience. They were our teachers – they guided us every step of the way.

### HOW (WHAT WE DID)

- Bundoran Farm ([www.bundoranfarm.com](http://www.bundoranfarm.com)) = Preservation Development. About 100 homesites have been carefully placed on 2300 acres of a beautiful working farm (cattle) with managed forests, apple orchards and (soon) a vineyard. Conservation easements and development guidelines for all of the residents will protect the farm in perpetuity. It is an Audubon International site with a full time natural resources manager.
- Location, placement and orientation.
- Designed for site/environment: Woodhill is in the woods and on a 17% slope.
- Lots of planning upfront.
- Took great care for natural environment (minimized disturbance).
- Limited grading and landscaping: gravel (nonpaved) driveway and small parking area.
- Bundoran Farm's infrastructure minimizes disturbance: road design (following existing farm paths and the contour of the land) and materials as well as buried power, phone and fiber optics.
- Limited footprint with efficient use of space (modest, sensible size): 1700 square feet of conditioned and finished space with 2 bedrooms, 1.5 baths, Great Room with living/dining/kitchen. (The partial basement is conditioned, but unfinished.)
- Good materials that will last.
- LEED (Leadership in Energy and Environmental Design): These design/build standards developed by the US Green Building Council ([www.usgbc.org](http://www.usgbc.org)) are recognized as the highest. While you may not choose to go for certification, using LEED professionals will allow you to design and build well. We decided to go for LEED certification.
- Used local resources: Architect (Sunbiosis, [www.sunbiosis.com](http://www.sunbiosis.com), Jeff Sties, LEED-AP), Builder (Artisan Construction, [www.artisaninc.com](http://www.artisaninc.com), Project Manager, Mike Ball, LEED-AP), subcontractors, milling, cabinetmaking ([www.craigdubose.com](http://www.craigdubose.com)), masonry.
- Used local materials: flooring (Bundoran Farm oak milled locally), lumber, timbers (South Carolina), soapstone (quarried just a few miles away), natural stone (West Virginia), fabricated metal brackets.
- Good, smart design: efficient use of space and natural light. Summer heat gain will be lessened by trees, orientation, roof overhangs, well insulated envelope (walls and ceilings) and windows/doors and cross ventilation.

- Septic system: gravel-less system minimizes footprint and disturbance of forest.
- SIPs: structural insulated panels roof system by Murus ([www.murus.com](http://www.murus.com)) provides excellent insulation while also maximizing usable space. These can also be used for the walls, but wasn't feasible with our design.
- Building envelope: designed and built tightly.
- Excellent sprayed foam insulation: bio based foam ([www.biobased.net](http://www.biobased.net))
- Geothermal: WaterFurnace heat pump that is efficient and quiet ([www.waterfurnace.com](http://www.waterfurnace.com)).
- Lots of natural light.
- Very energy efficient windows and doors: Loewen ([www.loewen.com](http://www.loewen.com)).
- Fibercement siding and trim: CertainTeed ([www.certainteed.com](http://www.certainteed.com)).
- Metal roof: Englert ([www.englertinc.com](http://www.englertinc.com)).
- Wood: sustainably harvested (local though not FSC).
- Wood finish: There's a lot of wood (southern yellow pine timber trusses, exposed southern yellow pine in master bedroom, pine clad tongue and groove ceiling, fir windows/doors and trim, cherry kitchen cabinets and railings, oak benches and Bundoran Farm oak floors). With the exception of some doors and trim, the majority of the interior woodwork was clear finished (multiple coats) with Waterlox, a tung oil finish ([www.waterlox.com](http://www.waterlox.com)). The floors were finished with Monocoat, a natural plant-based oil finish which is VOC free with extraordinary durability ([www.monocoat.us](http://www.monocoat.us)). Our goal was to make the inside as natural as possible.
- Energy efficient appliances and lighting: Energy Star rated ([www.energystar.gov](http://www.energystar.gov)).
- Water efficient toilets ([www.totousa.com](http://www.totousa.com)), faucets, stackable washing machine and dryer (LG)
- Modern, efficient wood stove fueled by downed wood on Bundoran Farm to lessen demand on geothermal electric heating system: Morso (<http://morsona.com>).
- Ceiling fans to distribute air (both cool and warm).
- Partial basement: part of house on stilts.
- Minimal exterior lighting: dark skies lighting (down lighting).
- Paint: low or no VOC, durable: Benjamin Moore's Aura
- Good interior doors: Simpson ([www.simpsondoor.com](http://www.simpsondoor.com))
- Minimize sound: We had to have a malfunctioning (noisy) exterior transformer replaced. The geothermal system uses a very quiet heat pump (heat and AC) in the basement - the original plans had a Crane heat pump outside, recognized as a relatively efficient and quiet system; but the WaterFurnace heat pump is even quieter!
- Landscaping will be limited. We will not plant grass, but use native, low water demand, non invasive species, such as laurel, redbud trees and natural ground covers. We'll let the forest and forest floor return as much as possible.

#### **OTHER THINGS TO CONSIDER (WHICH WE DIDN'T DO)**

- Rainwater harvesting: makes sense, particularly if house will be serviced by public water supply (ours is well).
- Stormwater measures: rain garden (we will not have a garden), grass filter strips and ammended soils (after heavy construction equipment). We did plant a small amount of native grass along the driveway as a remedial measure to control erosion until the forest floor reclaims it.
- Due to our wooded site, wind and active solar were, unfortunately, not an option.