



National Center for
Healthy Housing

Green Housing Series:

Rebuilding a Community through Healthy Green Innovation



As the rehabilitation of Wheeler Terrace wraps up, the distant sound of gun shots is being replaced with shouts of happy children playing in a new playground in the center of the complex. Ugly chain link fences have been replaced with elegant wrought-iron and the community's buildings and walkways have been redesigned to increase visual appeal—curving walkways are dotted with benches where neighbors socialize. Residents look forward to the spring

fragrance and blooms of new Cherry Blossom and Redbud trees as they plant vegetables in their community garden.

Built as Veteran Housing in 1947, Wheeler Terrace is now home to some of the most vulnerable District residents. Ninety-seven percent of the community is African-American with 90 percent of the households headed by single-females. Children make up half of the population. Seventy-three percent of Wheeler Terrace

households have annual incomes below \$10,000; the community's median income is just shy of \$5,600.

Over the years, the concentration of Washington's low-income residents, those with no where else to go, grew in Ward 8. Ward 8 had little retail amenities and for many years it was considered one of the City's crime hot spots. Disinvestment doesn't describe the condition of Ward; abandonment might be more appropriate.

Wheeler Terrace At-A-Glance

Owner/Developer: Community Preservation Development Corporation
 Architect: Wiencek + Associates
 General Contractor: Turner Construction
 Mechanical Engineer: Setty & Associates, Ltd.
 Green Consultant: GreenShape
 Property Manager: Edgewood Management

Other Partners:

- GreenHOME/GreenSPACE
- D.C. Department of Housing and Community Development
- Casey Trees
- D.C. Department of Health

Financial Partners:

- D.C. Housing Finance Agency
- Enterprise Community Partners
- Federal Home Loan Bank
- Home Depot Foundation
- PNC Bank
- Quadrangle Equity
- Union Bank of California
- U.S. Department of Housing & Urban Development

Development Costs: \$33 million (Approx \$131,000/unit)

Eligibility: 97% reserved for Section 8—households earning 50% AML or less
 Remaining available to households earning 60% AML or less
 10 units reserved for special needs; 7 for physically disabled; 3 for visually impaired

Amenities: Central AC, secured parking, blinds, laundry facilities and community center; on-site social services. Located close to hospital. Transportation accessible. Shared community facilities with nearby housing communities. Arts and tennis center close by. After-school programs, literacy programs, youth services.



Ward 8 also has the City's highest reported asthma levels and cases of children with blood lead levels. The CDC reported in 2004 that chronic respiratory disease was the seventh leading cause of death for District children under the age of one.

Before the renovation, Wheeler Terrace residents lived in conditions ripe with respiratory and asthma risk factors: leaking buildings and plumbing, inadequate ventilation, mold and mildew, and cockroaches. The indoor conditions of the homes were dangerous. Unfortunately, endemic crime in the neighborhood made life outside just as dangerous.

As dangerous and unhealthy as the community was, residents felt economically trapped. Affordable housing stock throughout the City has been decimated by rising housing costs and the public housing wait list is years long. Even abandoned Ward 8 was beginning to feel the housing crunch as developers and real estate investors discovered it as the city's last affordable enclave.

In 2006, Wheeler Terrace residents were faced with the prospect of losing their homes when the property's affordability requirement expired. The owner planned to sell the property to a developer intent on bulldozing it for redevelopment. Tenants joined together to form the Wheeler Terrace Tenant Association (WTA) and exercised their right of first refusal under DC law.

After interviewing numerous developers, WTA elected to transfer ownership and development rights to the Community Preservation Development Corporation (CPDC), a local non-profit housing provider. WTA was impressed with CPDC's commitment to affordable housing preservation and community empowerment, as well as with their expertise and experience in rehabilitating occupied multi-family rental complexes. It also committed to renewing the Section 8 housing contract for another 20 years. Since its inception in 1989, CPDC has developed or preserved 27 properties with over 4000 units.

The Greening of Wheeler Terrace

Although the District had just passed one of the boldest green building laws in the country, the project would not yet be subject to meeting its requirements. Nonetheless, as CPDC prepared its proposal for Wheeler Terrace, Mark James, its Project Manager, promoted the idea of developing it "green." He had experience with

I probably knew enough to be dangerous so I knew we had to assemble a good, knowledgeable green team.

—Mark James, Real Estate Development Officer, CPDC

green building from his previous job and was interested in pursuing green affordable housing within CPDC. As he stated, "I knew just enough to be dangerous," and apparently, persuasive.

CPDC's collaboration with their architect, Wiencek + Associates, on the Wheeler Terrace proposal also proved essential to the

project's green development. Wiencek had been incorporating green components into their affordable housing designs before they were called "green" and they were enthusiastic about the idea immediately. But more convincing was to come—especially with the Wheeler tenants themselves.

Over a series of meetings with WTA, CPDC determined what the residents liked about the complex design and what they wanted changed. Community meetings culminated in an off-site day-long planning retreat at a nearby community center where residents' voiced their biggest concerns: safety and livable units. When the development team discussed the idea of "going green" they were intrigued, but also apprehensive. They appreciated the potential health benefits that green building could provide, but they were worried about possible negative impacts such as increased costs.

CPDC organized a development team with extensive green experience to ensure the project's success. In addition to Wiencek, they brought in Enterprise Community Partners whose Green Communities Initiative is revolutionizing green affordable housing; Turner Construction, one of the first local construction companies to embrace green building products and techniques; and the National Center for Healthy Housing (NCHH), an expert on indoor environmental issues. They hired GreenShape, a green building consultant, to conduct an integrated design charrette to ensure a cohesive team effort.

Funding from Enterprise meant that certain criteria from the Green Communities Initiative had to be incorporated. Every green element introduced was considered from a first cost and long-term benefit perspective. Durability, life-cycle costs, and health and environmental impacts were questioned and a triple bottom line approach was taken for every design decision.

Because the project was a rehabilitation of existing buildings, there were some green design constraints, but the development

What's the cost per foot to give your residents better health?

—Mark James, Real Estate Development Officer, CPDC

team thought broadly about elements that would improve resident health and reduce energy costs and consumption. Design team members became advocates for specific green measures: Geothermal and green roofs were at the top of James' list, dual flush toilets for Jay Wilson, the architect from Wiencek; and NCHH pushed for an improved ventilation system, and Integrated Pest Management at the site.

Altering the roof design was a little bit of a disappointment to some members of the development team, but cost and structural upgrades prohibited the installation of green vegetative roofs. The installed roofs feature a reflective polymer that does not add to the heat island effect. That component, in combination with the rest of Wheeler Terrace's innovative renovation design, helped it achieve a Gold Leadership in Energy and Environmental Design (LEED) rating.

Renovation began in September 2008 and three buildings were renovated during phase 1. Renovation of the last four buildings (phase 2) began in May 2009. During construction, CPDC relocated residents to a nearby off-site apartment complex. Once renovations were complete, residents were moved back to Wheeler Terrace. Families living were given first option to return to their original units.

Renovations are scheduled to be completed in January 2010, at which point, Wheeler Terrace will be the first affordable housing community in Washington, D.C. to simultaneously meet the Enterprise Green Communities Criteria and obtain LEED Gold Certification from the U.S. Green Building Council.

Wheeler Terrace Lifecycle Costs*

	System HVAC Material Cost	Hot Water Material Cost	Total HVAC and Hot Water System Cost	Add'l Investment over Baseline (delta)	Operating Cost/Year	Operational Savings over Baseline	# Years to Pay Additional Investment
Baseline Case (ASHRAE 90.2)	\$1,800,000	\$178,500	\$1,978,500		\$301,098		
Ground Source Heat Pumps	\$2,450,000	\$178,500	\$2,628,500	\$650,000	\$255,115	\$45,983	14
High SEER HP- Elec.Backup	\$2,060,000	\$178,500	\$2,238,500	\$260,000	\$297,507	\$3,591	72
Ground Source Heat Pump w/Water Heating	\$2,800,000	\$178,500	\$2,978,500	\$1,000,000	\$194,390	\$106,708	9

Source: Wiencek + Associates, Architects and Planners DC, LLP

* Does not include HUD Payback

Note: Data are estimated. Values provided for comparison purposes only as utility costs are subject to change.

Wheeler Terrace DC Green and Healthy Home Demonstration Project

NCHH secured a \$1 million grant from the U.S. Department of Housing and Urban Development (HUD) to evaluate the health impact of the green and healthy upgrades at Wheeler. A subgrant to CPDC enabled the addition of an improved ventilation system to increase fresh air supply and distribution, the installation of bathroom and kitchen exhaust fans, and an Integrated Pest Management (IPM) program.

The Wheeler Terrace DC Green and Healthy Home Demonstration Project will be the first HUD demonstration to evaluate the impact of a multifamily green and healthy home retrofit on low-income housing residents. NCHH is evaluating how green and healthy features integrated into the Wheeler Terrace rehabilitation affect resident health and exposure to allergens.

With assistance from WTA, NCHH enrolled 44 households in the study and collected allergen samples from a subset of the units. A pre-intervention assessment determined residents' health status and housing conditions and established the study's baseline. NCHH is conducting follow-up assessments as residents return to their apartments and will conduct a final post-renovation assessment in one year.

NCHH opened the Wheeler Terrace development partners' eyes to what can be incorporated into a housing project to help improve health. They challenged the development team's notion about the best way to approach building ventilation and the importance of having a good IPM program.

By demonstrating that practical green and healthy measures can be cost-effectively incorporated in the Wheeler Terrace rehabilitation and their positive impact on resident health,

NCHH opened our eyes to what we should consider to improve our resident's health. We may not be experts in healthy housing, but we're starting to ask the right questions.

—Mark James, Real Estate Development Officer, CPDC

NCHH hopes to encourage similar practices throughout the District and beyond.

How has the Wheeler Terrace Renovation Impacted Residents?

NCHH is working to train several residents to function as Community Health Workers (CHW) to provide healthy home information to other community members. By heightening the resident connection and encouraging peer education, NCHH hopes to build resident engagement while increasing community capacity and promoting access to community resources and healthy home education.

The project team expects that many of the green and healthy elements included in the Wheeler Terrace renovation will improve the overall health as well as the respiratory and mental health of residents. NCHH post-renovation interviews and analysis will be available in the Fall of 2010.

Anecdotally, parents are less worried about letting their children play outside and the sound of random gun shots has subsided. The renovation removed many stress triggers, most likely without residents' awareness. The installation of

Sources of Funding

DC Department of Housing and Community Development Community Development Block Grant funds/Housing Production Trust Fund	\$10,250,000
Deferred Developer Fee	\$857,389
Enterprise Community Partners Grant	\$50,000
Equity—Low Income Housing Tax Credits issued by the DC Department of Housing and Community Development and purchased by PNC Bank	\$12,100,000
Federal Home Loan Bank Affordable Housing Program Grant	\$355,269
First Mortgage Bonds: Bond Issuer: DC Housing Finance Agency, Bond Purchaser: Union Bank	\$8,160,000
Home Depot Grant	\$50,000
HUD Healthy Homes Grant	\$450,425
Quadrangle Equity	\$600,000
TOTAL PERMANENT	\$32,873,083

the wrought iron fencing, while elegant and visually appealing, also serves to dissuade unwanted visitors. Combined with the introduction of full-time security, illegal activity on the property has been mostly eliminated. Police also stepped up their efforts in the surrounding neighborhood with the installation of surveillance cameras and increased police presence.

Wheeler Terrace's improved landscaping has encouraged residents to spend more time outdoors. Casey Trees assisted with the landscape design and then donated trees based on resident input and organized a tree planting event with residents. Although the weather was not supportive, rain did not stop several Wheeler tenants from taking part in the planting process. Many expressed "ownership" over the trees they planted and are eager to witness their blossoming in the Spring. A planned community garden also may encourage residents to get more engaged in the community and in a healthier lifestyle.

Wheeler Terrace residents have been in survival mode for many years, so the future does not always register. Food on table and a roof over the head takes precedence over environmental exposures. However, as CPDC works with residents to pull them out of survival mode, it is likely they will start thinking more proactively about improving their quality of life, paying greater attention to their health and the health of their families, and the impact the environment has on their lives.

From an economic and environmental standpoint, green features such as Wheeler Terrace's geothermal heat pump and dual flush toilets will pay for themselves within ten years and the savings accrued thereafter will be money in both resident and CPDC's pockets. Even at this point, energy efficient measures will result in a 25 percent reduction in energy consumption which will lower household and developer bills. The upgrades also will benefit taxpayers: as utility bills decline so will the stipends the federal government pays out.

Lessons Learned

- Make green decisions early. Set energy efficiency and green goals first; then determine the most effective way to achieve them using green technology and practices so time is not wasted. Evaluate elements from a first cost and long-term benefit perspective to determine ultimate value to the project.
- Start visioning with staff and board to get early buy-in; then move to the rest of the development team members. Grant funds are available for charettes to encourage this integrated process.
- Work closely with residents so that they understand the costs and benefits of green design. Ask them for input on decisions, such as whether to go "smoke free", how to incorporate integrated pest management techniques, and also on the finishes that are to be used in their homes.
- Avoid tenant "utility waste" by making them a partner responsible for utility costs.



Healthy flooring



Renovated apartment



Post construction bathroom



Community charrette

Green Elements

- Geothermal heat pump
- DeSuperheater for hot water (uses geothermal system)
- Fresh air ventilation system
- ENERGY STAR appliances and lighting
- Operable energy-efficient windows
- Water efficient fixtures, including low-flow shower heads, dual flush toilets
- Low-volatile organic compounds (VOCs) paints, sealants, adhesives and carpets
- Installation of high efficiency Insulation
- Environmentally-friendly building materials with high pre- and post-consumer recycled content, specifically flooring, gypsum board and concrete
- Preservation/salvage 100% structural elements; 80% nonstructural elements
- Flat roofs replaced with new energy efficient white pitched roof
- Low volatile organic compounds (VOCs) paints, sealants, adhesives, cabinets, carpet and flooring
- Upgraded infrastructure and sewage system
- Stormwater sand filter system
- Recycled construction waste
- Green opportunities center w/interactive green education exhibits and community space
- Community garden
- Transportation accessible: Metrobus stop in front of complex; Metro ½ mile away

Specific Healthy Home Interventions

- Improved ventilation system to improve fresh air supply and distribution
- Installation of energy efficient bathroom and kitchen exhaust fans
- Sealed building envelop to control moisture and pest intrusion
- Integrated Pest Management program
- Trainings for construction and development staff
- Healthy homes resident education
- Rubber walkoff mats

- Evaluate what elements can be included in tax credit basis points at an early stage.
- Create a specialized training team for residents, maintenance, and property management.
- Provide on-going education to help maintenance staff understand new products and techniques.
- Develop alternatives to educate skeptical residents. NCHH's effort to train residents as Community Health Worker program will hopefully be an effective method to provide healthy homes information.

Residents see CPDC's involvement at Wheeler Terrace as part of the solution to the violence and crime by helping to create a better sense of community among the residents.

—Sharon Hockaday, WTA Vice-President

The National Center for Healthy Housing (NCHH) is a 501(c)(3) nonprofit dedicated to creating healthy and safe homes for children through practical and proven steps. For more information about green and healthy housing, visit: www.nchh.org/training/Green-and-Healthy-Housing.aspx.