Sustainable Housing Reconstruction
Designing Resilient Housing After Natural Disasters
Hurricane USA
The Gulf Coast of the USA has a long history of hurricanes. These are becoming more intense and frequent, largely due to climate change. In August 2005, one of the fiercest hurricanes in recent history – Hurricane Katrina – hit the coastal states fringing the Gulf, with physical devastation extending far inland. Hurricane Katrina killed more than 1800 people, injured more than 5000, and inflicted US$108 billion damage to property. It displaced more than one million people and damaged one million housing units, more than half of which were in Louisiana, the worst-affected state, and 220,000 of which were in Mississippi.1, 2, 3, 4, 5

Katrina’s devastation was so extensive, and the need to rehouse the victims so acute, that reconstruction presented complex challenges in terms of timely delivery and in matching new housing to the needs of the disaster-affected people. In the initial stage, the Federal Emergency Management Authority (FEMA) provided temporary accommodation in caravans locally known as ‘FEMA trailers’. These were a short-term solution and in short supply.

Not surprisingly for a disaster in one of the most affluent countries of the world, a multiplicity of agencies and actors initiated reconstruction projects. One of the first permanent housing solutions was the ‘Katrina Cottage’, designed by architect Marianne Cusato, and constructed in Louisiana and Mississippi. Roughly the size of a FEMA trailer (28.6 square metres), the ‘cottage’ was built of fibre-cement outer walls, timber framing and metal sheet roofing, and was designed to be wind-resistant and with provision for future extension. Its ease of construction made it a widely adopted housing reconstruction solution.6, 7, 8

One widely publicised reconstruction initiative in the Lower Ninth Ward in New Orleans was the Make It Right project.9 It was initiated in 2007 and funded by film actor, Brad Pitt, who invited 21 architects, many of them renowned internationally, to design houses to address reconstruction needs in one of the most ravaged areas of the city. By 2013, 90 of the planned 150 houses had been constructed.10 These were well-built and energy-efficient. However, as each architect chose a different design template and construction system, thus raising construction costs, these houses were beyond the reach of the low-income community that lived in the area before Hurricane Katrina.

Compared to the Make It Right project, other projects had more success in providing affordable housing and incorporating community facilities for the large low-income disaster-affected sector. For example, in Biloxi, Mississippi, Architecture for Humanity (AFH) undertook a similar project to Make It Right, bringing together a number of architects to support reconstruction.11 Sustaining the housing initiative required the support of locally based organisations. When AFH folded up their project, the Gulf Coast Community Design Studio continued AFH’s work in Biloxi by establishing a base within the community and working with a local community development agency.

The case studies that follow are located in the two most affected states, Louisiana and Mississippi, and present a set of lessons for future rebuilding after disasters. For example, in Biloxi, Mississippi, is an example of how a team of architects can work collaboratively with a community development agency to contribute to effective housing reconstruction and infrastructure. The Musicians’ Village in New Orleans, Louisiana, is an affordable housing project where a community has been rebuilt specifically to nurture the music heritage of the city.
Hurricane Katrina, 2005

Consultative housing reconstruction

The ferocious Hurricane Katrina made landfall on 29 August 2005 and ravaged the Gulf Coast states of the USA. Mississippi incurred the worst property damage, with rapid inundation of 90 per cent of its coastal cities by a 9-metre storm surge invading 20 kilometres inland. More than a million of Mississippi’s 2.9 million population were affected, 235 people lost their lives and more than 220,000 houses were impacted.12, 13

The devastating winds of Hurricane Katrina and inundation from the huge storm surge caused enormous destruction to the beachfront city of Biloxi in Mississippi. The toll was particularly severe because the city had a large stock of old and weakened housing that was built before hazard-resistant building codes were instituted. Mississippi had the highest rate of low-income households in the USA – more than 42 per cent – at the time of the hurricane. A survey of 6000 households in Biloxi showed nearly all residents lived below the national median income level. As a result, 90 per cent of Biloxi households had no flood insurance before Hurricane Katrina which destroyed 80 per cent of the housing stock.14 Exposing disparities that normally remained concealed, the hurricane hit a vulnerable population, one that could least afford the social and economic costs of the damage and reconstruction.
‘After hearing about the hurricane we escaped to our daughter’s house in Savannah, Georgia. When we came back, we found our house was gone; we lost everything!’

– Flora Williams, Biloxi, USA

<table>
<thead>
<tr>
<th>Implementing agencies</th>
<th>Cost</th>
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<tbody>
<tr>
<td>G CDS; Hope-CDA</td>
<td>US$750–900 per square metre depending on the amount of volunteer labour</td>
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<tr>
<td><strong>Donors</strong></td>
<td><strong>Type of post-disaster project</strong></td>
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<td>Reconstruction and rehabilitation</td>
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<td><strong>Context</strong></td>
<td><strong>Date completed</strong></td>
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<td>2008</td>
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<tr>
<td><strong>Location</strong></td>
<td><strong>Number of houses built</strong></td>
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<tr>
<td>East Biloxi, Mississippi, USA</td>
<td><strong>57 new houses</strong></td>
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<tr>
<td></td>
<td><strong>187 rehabilitated houses</strong></td>
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Why this project case study?

The Gulf Coast Community Design Studio (GCCDS) was established as an outreach program of Mississippi State University. Led by architect David Perkes, it operates as a team of architects, or ‘studio’, to respond to the specific reconstruction needs of the Biloxi community.

The GCCDS model has two key aspects:

- designing through community consultation; and
- working in partnership with a community development agency.

This model offers valuable lessons for reconstruction as evidenced by the quality and appropriateness of the housing that was built and the consultative process that enabled the disaster-affected community to recover relatively faster than similarly devastated ones.

Agency roles

The Biloxi housing project was a collaboration between two agencies – GCCDS and Hope Community Development Agency (Hope-CDA). Hope-CDA was a community development agency set-up after Hurricane Katrina to deliver community development programs and to assist low-income communities to access affordable housing. GCCDS and Hope-CDA established offices together in East Biloxi.

The project’s first set of houses was built from funds from both private and philanthropic sources. Subsequently, the bulk of funding was provided by the government through the Department of Housing and Urban Development (HUD) and the Mississippi Development Authority.

The reconstruction process

Initial ‘case management’ was carried out by Hope-CDA and involved identifying potential housing beneficiaries, determining their eligibility, and advising them of options. Even though the focus was on housing, Hope-CDA facilitated a holistic community development package. This included, for instance training in financial management, job skills and home buyer education.

After beneficiaries qualified for housing support, GCCDS worked with each household to design and build a house according to the following principles:

- Consider household structure and needs.
- Match design to budget and site conditions.
- Design with nature by utilising natural light and ventilation.
- Reflect local building traditions.

GCCDS conducted detailed housing damage assessments and prepared topographical maps to understand the extent of house elevation required in specific sites. Designs had to meet revised building regulations that required houses to be elevated above the level of the Katrina storm surge. Technical aspects such as cost-effectiveness, hazard-resistance, energy efficiency and meeting local building codes were also of concern.

Before the hurricane, most people lived in family-owned houses passed down through generations. In the few newer houses – covered by a mortgage and insurance – the insurer reduced or paid-off any remaining mortgage amounts. However, most affected households usually did not have enough money for rebuilding. As a result, Hope-CDA provided...
David Perkes
Architect, and Founding Director, GCCD

An important aspect of our work has been working with community organisations like Hope-CDA that we share the building with. They do the work to figure out who qualifies for which assistance program, and coordinate volunteers. It was important for us to figure out how to fit within this and how to provide the technical part – the design and construction.

Our focus was to do everything we could to make sure that the people that were going to live in the houses had a real involvement in the process.

Each house was a separate project with its own set of construction documents. None of those projects were stuck with a limited set of plans and we were able to manage that within our technical knowledge and not feel like we were just giving people floor plans.’

Amanda Bauman
Case Manager Supervisor, Hope-CDA

‘It’s all right here, a one-stop shop. People would come and meet with a case manager, who would determine their eligibility. Then they would stay at the same place to talk with the Design Studio. Since we were sharing a space, it was very easy to walk a few feet to talk to the architect to figure out how everything was going, if any changes need to be made, and so on.

The model was to meet with the homeowner, finding out exactly what they wanted to see in their homes. Yes, it was building houses more resistant to storms, but in addition it was listening to the client and designing according to those conversations.

There isn’t one set of blueprints that we used over and over again. We never did two similar houses next to each other.’

these households with a ‘forgivable grant’ towards the rebuilding of their homes on the condition that they lived in the house for 5 to 10 years depending on funding source. Households that decided to sell or rent their homes had to repay a portion of the grant according to the number of years of full-time occupation. This arrangement acknowledged that people’s circumstances may change and thus facilitated flexibility over time.

Key project features and design aspects

Distributed housing
In this project 57 new single-family houses and 187 rehabilitated houses are scattered throughout East Biloxi, with each house designed or repaired according to specific household needs and site conditions. Housing was rebuilt on the existing house sites for homeowners across the city, maintaining the sort of local links and networks that can be a challenge to maintain in greenfield sites where new communities are established.

Consultative design process
Case-by-case consultation on house design and construction with individual beneficiary households allowed the architects to tailor the design to what the families needed and wanted.

Design choices
Householders were able to choose the type and colour of the laminate flooring, floor tiles, appliances, counter tops, cabinets, trim, tiles and finishes, as well as make adjustments to the room layout and positions of window and doors, and to exterior and interior colours.

The architects avoided vinyl siding for external wall cladding and used more durable (and environmentally preferable) timber or composite sidings. Carpeting was avoided because it was unsuitable for a tropical climate and instead laminated timber flooring was used, giving a natural quality.

Climate-sensitive design
The houses were designed to be responsive to the local tropical climate. For example, ceiling heights were up to 2.75 metres instead of a more usual 2.45 metres, to improve ventilation and create a cooler interior as well as provide sufficient height for ceiling fans. Windows were sized and positioned to take advantage of natural breeze and light to make house interiors comfortable and reduce ongoing energy costs. Many of the designs were derived from the traditional ‘dogtrot’ house with a central breezeway or common space to provide light and ventilation and with rooms on the two adjacent sides. Following local tradition, all houses had large, airy, comfortable balconies or porches. Each house was raised on stilts up to a height of about 5.5 metres to comply with the new building regulations, which created a shaded undercroft space with free air flow.
Flexible grants support changing circumstances

David Wallis, a commercial fisherman, is renting a GCCDS-designed house just across the road from the GCCDS/Hope-CDA office. The original owner had developed lung cancer and had to move to New Orleans for treatment. So he sold the house and repaid a portion of his grant to Hope-CDA. The new owner was renting the house to David, who had moved there in April 2013 with his wife and three children. David’s previous house, about 20km away, was destroyed in the hurricane, and he moved to his present location because the rent was affordable.

The house is raised on timber stilts about three metres above ground level to comply with the revised building code. It has three bedrooms, two bathrooms, kitchen and living/dining room, and is accessed with a single-flight staircase going down from the porch. David believes that the house is ‘really well-built’ as it has two layers of floorboards instead of one to make it stronger, and cross-bracings to prevent vibrations from a nearby railway track. He also appreciates the spray foam insulation under the floor: ‘The house stays really cool and I’ll save money on the utilities bill,’ he says.
Respect for the environment
Special attention was given to the sensitive location of the houses within the existing landscape. For example, a significant number of large oak trees in the area survived the hurricane and were retained on site for shade and natural ambience. Each house was specifically designed to fit into its site with minimum site intervention, taking advantage of existing vegetation to frame views from the house and maximise natural cooling and lighting.

Improving house plans through rehabilitation
Most of GCCDS’s work in the first two years focused on rehabilitating damaged houses. Many of these were old, often with poorly designed alterations and extensions that had then become the most hurricane-damaged parts of the house. GCCDS rehabilitation included re-design, with spaces re-arranged for better functional performance and future disaster resilience.

Success factors
Consultation
More than any other factor, the extensive consultative design process contributed to the success of the GCCDS project. Through engagement with the end-users, it was possible to meet their needs and provide design services to produce well-designed and appropriate housing.

Disaster risk reduction
All houses followed the revised building codes for wind-resistance and floor heights. Following GCCDS’s housing damage assessment and topographical mapping, houses that were assessed as damaged by more than 50 per cent had to be rebuilt. Rebuilt and new houses had to be elevated above the revised Federal Emergency Management Authority (FEMA) base flood level, more than 5 metres in many places because of the huge storm surge inundation. GCCDS assisted people to determine how high they had to build their houses, often increasing the figure to add functionality to the housing. For example, if a house needed to be raised 2 metres, beneficiaries were advised to build the floor a bit higher so that a car could fit under it. Some people were advised to build higher than the base flood level and have extra ‘freeboard’ (building extra watertight distance between flood level and the house’s lowest possible water entry point) to get a discount on flood insurance.

Cross-bracings were added to connect the long posts, contributing to the building’s resilience to hurricanes.

Environmental sustainability
Although the budget did not permit building highly energy-efficient houses, an extra US$2000 or so per house was invested for better insulation, with spray foam being used instead of the typical fibreglass batt insulation. Applying insulation under the roof instead of under the attic also provided improved energy efficiency.

Environmental remediation
In addition to its reconstruction work, GCCDS led a project to restore a degraded local wetlands area, Bayou Auguste Neighborhood Wetland Park, as a flood retention area and to minimise future storm surge impact. This was achieved by clearing garbage, re-establishing meandering water channels and restoring local vegetation. The Wetland Park provides habitat for fish and crustaceans, and thus helps with local livelihoods.
Flora Williams has been a resident of East Biloxi for nearly 40 years. Her old house where she raised four children was destroyed in Hurricane Katrina. Hope-CDA helped her to build a new house designed by GCCDS. She now lives there with her husband, who is elderly and has disabilities.

An architect from GCCDS visited her and discussed what she needed, explaining that the house would have to be raised by 2.75 metres because of the new regulations. Flora then mentioned that her husband was disabled and required special provision. She also wanted a lot of light in the house. ‘After the hurricane we used to feel depressed; so I wanted a bright, cheerful house,’ she says.

The architect developed a design that included a small lift, as well as an almost 30-metre long ramp in case of power failure during hurricanes. This made the house expensive, so only two bedrooms could be provided. Flora liked the design although she would have preferred a third bedroom, as before, so that her children could stay when they visited. She was able to choose the colours and finishes, and she chose a peach colour, which she really likes.

Flora and her husband moved into the new house in 2007. She really likes it because of the large windows that bring in a lot of light. She also likes the undercroft space and often spends time there. ‘It’s my favourite part of the house with the nice breeze and all the light for my plants,’ she says.

Flora; her house; and its floor plan. Source: floor plan adapted from GCCDS.
as well as serving as an important recreational area for the community. The integration of such elements with the housing reconstruction led to a wider set of positive impacts for the disaster-affected community.

**Construction by volunteers**

The involvement of volunteers saved costs, and their lack of a profit motive helped avoid the substitution of quality specifications with cheaper, less-resilient materials and to ensure quality workmanship. Supervision by GCCDS staff further ensured quality.

**Teamwork**

The individual specialisations of GCCDS and Hope-CDA were complementary. GCCDS provided building and design expertise, and Hope-CDA provided local community knowledge, client consultation and social support.

**Multi-disciplinary team**

Although led by architects, GCCDS was multi-disciplinary. For example, a GCCDS engineer developed a friction pile foundation system that allowed a building design based on a minimum soil resistance value regardless of soil conditions. This helped save the cost of soil tests, and was an improvement over more costly concrete pile house designs.

**Embedded within the community**

GCCDS and Hope-CDA set-up in the heart of the community they served and provided community development and design services, not only for construction of new houses but also for long-term maintenance and repair.

**Livelihood support**

The project benefited many local building product businesses and tradespersons. Hope-CDA provided training on financial management and job skills for small-scale entrepreneurs. With GCCDS’s support, two other community-based partner organisations, Women in Construction and YouthBuild, promoted employment opportunities in the building sector for women and youth and provided on-the-job construction training.

**Link with university**

There were several benefits to GCCDS being an outreach program of Mississippi State University. In exchange for the expertise and time of university specialists, some of the work brought income back to the University and greatly enhanced its local reputation. Student volunteers contributed to project cost-effectiveness as well as gaining valuable experience for their future careers.

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**The challenges**

Despite the difficulties typical of a post-disaster context, the project was implemented effectively. There were inevitable challenges, including:

- **After Katrina, numerous agencies and builders arrived in Biloxi to assist reconstruction.** Experienced agencies such as Architecture for Humanity and Habitat for Humanity implemented projects, but there were others that did not have adequate capability. The newly formed GCCDS had to establish its place within this multiplicity of actors, which required commitment and demonstration of credibility.

- **Project management was a challenge,** with architects, engineers, volunteers, tradespersons and contractors having to work together. Architect David Perkes describes the initial period as ‘a completely baffling kind of system of construction’. Eventually the groups learned to work with each other.

- **In hindsight, GCCDS realised that additional resilience measures could have been built into the designs.** For example, including an adhesive plastic sheet instead of felt in the roof would have made the houses more waterproof because water would not be able to penetrate inside if roof shingles flew off in a strong wind. This feature would have also reduced insurance costs. Later GCCDS house designs were modified in response.

**Lessons learnt**

The way GCCDS and Hope-CDA implemented the reconstruction project offers valuable lessons such as:

- **Architects can play a significant role by using their design skills and capacity for multi-disciplinary work to rebuild houses that specifically meet the needs of households.**

- **Working in partnerships with groups with complementary expertise greatly improves the capacity to address the multi-dimensional challenges of post-disaster housing.**

- **Reconstruction projects can address a wide set of community needs through the development of livelihood skills, job creation, supporting local businesses, the restoration of natural landscapes and the training of future professionals.**

**In conclusion**

This project shows how agencies can build upon their individual institutional strengths to address the complex challenges of post-disaster reconstruction. The work of GCCDS in particular highlights the role of the architectural profession in successful housing reconstruction. Teamwork between agencies, in-depth consultation, a base in East Biloxi near the disaster-affected community, the emphasis on local job creation and business development, as well as providing real-world learning for architecture students, are the key positive elements that make this a model housing project with potential replication of the process in disaster-affected areas worldwide.
Hurricane Katrina, 2005

Musicians’ Village

The destruction in New Orleans during Hurricane Katrina was mostly due to failure of the embankments along Lake Pontchartrain, unlike other areas closer to the coast where the main impact was from powerful winds. Many low-lying areas were rapidly inundated by rushing water.\textsuperscript{15} Populated largely by low-income households, the Lower Ninth Ward was one of the most severely impacted parts of New Orleans.\textsuperscript{16}

New Orleans is a city famous for its musical culture, and many of the city’s musicians lived in the Lower Ninth Ward. The Musicians’ Village project was targeted to address the needs of New Orleans’s musicians, and to preserve the musical heritage of the city.
‘My house in the Lower Ninth Ward was destroyed by Hurricane Katrina. A 25-foot wave rushed through my backyard!’

– Smokey Johnson, New Orleans, USA
Why this project case study?

This New Orleans Area Habitat for Humanity (NOAHH) project was one of the few projects in New Orleans that specifically targeted urban, low-income, disaster-affected households by providing affordable housing. The project aimed to build a community rather than simply a group of houses.

Agency roles

Two internationally renowned musicians, Harry Connick Jr and Branford Marsalis, both native New Orleanians, approached NOAHH with the idea of building homes for displaced musicians. NOAHH had identified a large tract belonging to the Orleans Parish School Board for the construction of houses and the idea blossomed into the concept of a neighbourhood and musical hub. NOAHH was impressed with the concept and partnered with them to implement the project.

NOAHH approached the School Board about purchasing the tract of land; the School Board insisted on a bid process and NOAHH was the only bidder, acquiring the land for approximately two-thirds of its pre-disaster appraised value.

Another key partner was the First Baptist Church of New Orleans, led by Pastor David Crosby. The church had planned to build 40 houses in the area under the name of the Baptist Crossroads Project (BCP) a year before Hurricane Katrina. After Katrina, BCP merged with the NOAHH project and, together, they implemented the Musicians’ Village project.
The main intent was to preserve the musical heritage of New Orleans. Although we had the welfare of the disaster-affected people in mind, this was not a giveaway project. We provide capital, not charity, to our partner families. As in all Habitat projects, we followed the same criteria: need for shelter, ability to pay, and willingness to partner.

However, the houses were built and sold at an affordable cost and the terms of the mortgage were favorable to the homeowners at zero interest rate; the average monthly mortgage payment is US$600; to rent a three-bed house even in that area would be more than US$1000 per month. Most of the homeowners never had anybody in their extended families who owned a house.

The houses were designed by Michael Bell, a local architect, then adapted to the owners’ needs for location of rooms, finishes, etc. We followed all the standards to make the houses disabled-friendly, energy-efficient and hazard-resilient. If we knew that somebody needed a ramp, we built it; if somebody became ill and had special needs, we retrofitted the house.

The reconstruction process

The project was announced at a press conference and publicised through community organisations. Because the project’s intention was to create a neighbourhood for musicians, applicants were screened to verify that they were musicians or linked to the music community.

Applicants who did not meet the Musicians’ Village selection criteria, but met other needs-based selection criteria, were allocated houses in NOAHH projects in other neighbourhoods. A few families had qualified for a Habitat home prior to the failure of the levees and floodwalls and they were included in the Musicians’ Village; however, over 90 per cent of the housing went to musicians.

Because many musicians had informal, untaxed income, often earned in cash, NOAHH took innovative approaches to establish applicant creditworthiness, for example, by accepting diary entries of forthcoming performances. Applicants with outstanding debt or bankruptcy were not accepted. Instead, they received support from NOAHH to improve their creditworthiness and to reapply.

Project houses were provided with a no-interest 20-year mortgage. Each successful applicant household was required to contribute 350 hours of ‘sweat equity’ instead of a deposit. This included working on the construction of their own or nearby houses – or even performing music for volunteers.

Each monthly instalment includes repayment on the loan principal, land tax, termite treatment and insurance. Monthly repayments are US$500–600, depending on the conditions of particular insurance schemes. For example, households with a scheme that was locked-in without adjustment for inflation had lower premiums.

Key project features and design aspects

Multiple project components

Spread across 3.3 hectares on five city blocks, the Musicians’ Village consists of 72 single-family detached houses, five duplexes for elderly residents, the Ellis Marsalis Center for Music and a children’s park. The multiple components extend the project beyond the provision of post-disaster housing and contribute to a sense of community.

Single-family houses

The single-family houses are elongated with the narrow façade being the side facing the street in a design derived from the traditional ‘shotgun house’ of southern USA. Each house is approximately 100 square metres and typically comprises three bedrooms, a living and dining room, and a bathroom with laundry space. People had a choice of seven façades based on traditional patterns, as well as a choice of carpets, counter tops, exterior trim and siding colours, tiles and finishes. They also were able to make small adjustments
to the room layout and the position of windows and doors, and paint the interior and exterior with the colours they preferred. Indeed, a key feature of the Musicians’ Village has become the variety of colour; many houses were painted in warm, radiant shades.

**Duplexes for the elderly**

Five duplexes for the elderly were built and rented to elderly or retired residents. The duplexes were grouped facing the street. Each duplex has two residential units with separate entrances. The duplexes followed the Americans with Disabilities Act standards, with four of the units fully compliant, and included features such as 91.5-centimetre doors for wheelchair access, grab-rails and accessible positioning of electrical outlets.
A home for an illustrious musician

Smokey Johnson’s house in the Lower Ninth Ward was destroyed by the hurricane. Since 2007 he has lived with his wife in a three-bedroom house in the Musicians’ Village. Because he is 76 years old and wheelchair-bound, a ramp was built at the back of his house to allow access because the house is built on a high plinth to raise it above flood level.

Smokey is a prominent musician, not only in New Orleans, but internationally; he was the drummer for the famous jazz musician, Fats Domino. He travelled with Domino’s band to play music in many countries – Australia, France, Japan, etc. His son is also a musician and plays at a prominent nightclub in the city. By living in the Musicians’ Village, Smokey can continue to play and teach music at the nearby Ellis Marsalis Center for Music.

Smokey grows carefully-tended garden vegetables and flowers, a sign of his sense of belonging. ‘I’m happy to get this house. This is my home,’ he says.
**Musicians’ Village houses resist Hurricane Isaac**

Alvin Johnson plays the piano and is a rhythm-and-blues musician. He previously lived in the Lower Ninth Ward and his home was destroyed by Hurricane Katrina’s rushing seven-metre high floodwater. He was lucky to be visiting a friend in Mississippi for a barbeque on that day, and so survived.

Alvin says, ‘After staying for a few years in different places, I heard that Habitat for Humanity was building a village for musicians. I applied and got this house. I had to work for 350 hours on other houses, which was a great way not to pay a down payment.’

Alvin prefers ‘calm’ colours, so chose beige and white for the inside and outside of his house. Living in the Village has allowed him to receive training at the Center for Music to improve his skills. He likes the park and on pleasant days goes there to relax with friends.

A year ago, Hurricane Isaac hit the city, but Alvin’s house was not affected. There was power outage in the area for a few days, so he stayed with a friend for that time. Upon returning he was pleased to find that everything was all right in the neighbourhood.

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**New housing affordable on a low income**

Rhonda Ford, an owner of a house in Musician’s Village, works in various music-related odd jobs – helping make Mardi Gras and other festival costumes, marketing concerts and related events, and contacting musicians. Her children have grown up and left home, though her youngest daughter sometimes stays with her. She is separated from her husband and lives with her taxi driver partner.

At the time Hurricane Katrina struck, she was living at her daughter’s house, which flooded and was damaged by 2-metre high water. After two years of temporary accommodation – hotel, church, mother’s house, trailer – she moved into her new house.

Rhonda has a low income, but paying a US$506 repayment per month for the house is within her means. She was shown different house models and chose an L-shape design. ‘I was pleasantly surprised with the design. You couldn’t beat it with a stick,’ she says.
Success factors

Contextual design
House designs derived from local New Orleans housing made the houses attractive. The opportunity to select façades, finishes and colours, and to make interior adjustments, allowed residents to personalise their houses and develop a sense of ownership.

Integration with community facilities
Although the focus was on housing – the mandate of Habitat for Humanity – community facilities such as the music centre, residences for the elderly and the children's park allowed the project to expand in scope and provided the amenities that support lively community activities.

Environmental sustainability
Energy-efficient features include: low emissivity glass in windows, low energy water heaters, radiant barrier roof decking for thermal comfort, and spray foam insulation to seal all gaps.

Disaster risk reduction
The project area was flooded after the hurricane, but not to the same extent as the Lower Ninth Ward. With the construction of a new levee nearby, the Upper Ninth Ward was considered a safe place to build. Nevertheless, houses were built more than 30 centimetres above the Federal Emergency Management Authority (FEMA) base flood level, on a raised plinth, on average 1.7 metres above ground level. Houses were built to International Building Code standards for wind-resistant construction. This means that the houses can withstand winds of more than 200 km per hour. When Hurricane Isaac struck in 2012, there was no structural damage to the project houses despite nearly 60,000 houses being damaged across south-eastern Louisiana.

Construction by volunteers
The involvement of volunteers and homeowners (through the Habitat for Humanity construction model) not only saved costs but improved the quality of the built product. This was also because the volunteers and beneficiaries, unlike building contractors, had no profit motive. Qualified architects and engineers supervised to ensure the quality of the design and construction of the housing.

Extensive experience
The extensive experience of the major agencies involved made a strong contribution to the success of the project. Habitat for Humanity has an excellent reputation and global experience in the field of low-income housing. NOAHH has been active in New Orleans since 1983 and has built close to 600 houses in the area as well as repaired about 100 owner-occupied houses.

The challenges
Despite its success, the project faced some challenges including:

- Due to local shortages and high prices, the project used imported Chinese plasterboard that was later found to have a high aluminium and sulphur content and that emitted gases that damaged materials made of copper and posed an alleged health hazard, requiring NOAHH to spend US$55,000 per house on remediation. Residents had to be provided with temporary housing and all plasterboard replaced by a tested local product. Prolonged litigation has followed, where NOAHH is a lead plaintiff on behalf of the homeowners.
- NOAHH provided homeowners with training and a manual on maintenance, but many, being first-time homeowners, were not accustomed to undertaking maintenance activities. Maintenance of natural wear-and-tear is posing a challenge for households on limited incomes.

Lessons learnt
The positive elements of the Musicians' Village project offer the following lessons for housing reconstruction:

- Competent built environment professionals and a humanitarian agency such as NOAHH can work effectively in a team with volunteers and affected communities. Design sensitivity to context and with flexibility for adaptation by users produced satisfactory housing results for all concerned.
- NOAHH managed to achieve a careful balance between not being a charity and yet providing financial advantages to affected communities. The project beneficiaries, while not feeling like recipients of pity, found housing that they could never otherwise have afforded.
- Integration of community facilities, particularly the Ellis Marsalis Center for Music, helped to establish a community and preserve local cultural heritage. To be effective, reconstruction projects often need to go beyond just building houses.

In conclusion
New Orleans had a high poverty rate and significant social disparity before Hurricane Katrina, which the disaster brought into focus. Many of the project beneficiaries, mostly musicians in this city with a vibrant music culture, had low incomes and had lived previously in inadequate housing. The Musicians' Village provided them with well-built houses in a neighbourhood with facilities, safeguarding them from future disasters, and helping the music tradition of New Orleans to continue to flourish.
Other notable post-Katrina housing reconstruction projects

**Biloxi Model Home Program**
Implemented in Biloxi, Mississippi, after Hurricane Katrina by Architecture for Humanity. For more information, see: http://architectureforhumanity.org/files/biloxibook_final.pdf (accessed 10 February 2014).

**Build It Back Green Program**
Implemented in New Orleans, Louisiana, after Hurricane Katrina by Global Green USA. For more information, see: www.globalgreen.org/articles/global/75 (accessed 10 February 2014).

**Make It Right**
Implemented in New Orleans, Louisiana, after Hurricane Katrina by the Make It Right Foundation established by actor Brad Pitt. For more information, see: http://makeitright.org/ (accessed 10 February 2014).

**URBANbuild**

Notes

4. FEMA and HUD (US Department of Housing and Urban Development), *Current Housing Unit Damage Estimates: Hurricanes Katrina, Rita and Wilma* (Denton, TX: FEMA (Federal Emergency Management Authority), 2006), Region VI.
12. FEMA and HUD (US Department of Housing and Urban Development), *Current Housing Unit Damage Estimates*.
14. Ibid.