

# SMALL BUILDING **BIG** DREAMS

Does a limited budget limit creativity and sustainability? The recently opened Worldwide Fund For Nature (WWF) regional headquarters in Braamfontein, Johannesburg, shows how working within constraints can result in innovative design and affordable green technological solutions.

WORDS MARY ANNE CONSTABLE PHOTOGRAPHY CHRISTOPH HOFFMANN

The modest, green roofed, four-storey building sits on a tight 248m<sup>2</sup> corner site in the Johannesburg CBD. The building was handed over to the WWF at the end of January 2015 and will, in the next few months, be applying for a 6-Star Green Star SA rating with the Green Building Council of South Africa (GBCSA) under the Green Star Office v1 rating tool for both Design and As Built.

If achieved, this building will be the fifth in South Africa to achieve a top rating in this category – and it will show a green building does not have to include expensive sustainable technologies to achieve recognition.

It takes time to fine tune and adjust sustainable systems in a building, explains environmental consultant and project manager Richard Duckitt from Bornman and Associates. But despite some initial challenges, he says the systems are performing according to expectations.

## REUSING AN EXISTING BUILDING

The original intention was to demolish the entire two-storey building because it held no heritage value, explains project architect Simon Cretney of Alive Architecture. However, reusing the existing brick facade presented an opportunity to demonstrate the concept of reusing “waste”, while honouring the past. “Although it fits comfortably in its urban environment, the building stands out,” says Cretney.

It took about 1.5 months to deconstruct the rest of the building, says Duckitt. The salvaged bricks, timber floorboards, joists and beams, plus some corrugated sheeting was stockpiled in the building next door and cleaned. More than 80% of the original material was suitable for reuse in the new building and the rest was recycled in other ways. Broken bricks were crushed to create aggregate, and other materials were donated to the community.

Some of the timber is being used to create furniture and fittings inside the new building. “Waste management was a very important part of the project,” says Duckitt, “and we achieved very good recycled content.” The contractor was required to send a quarterly waste management report.

## ON SITE CHALLENGES

A big on-site challenge was digging a 4.5m deep basement to house the black water treatment system, rainwater storage tank and lift hydraulics, only one metre away from the existing two-storey facade. The wall was anchored to scaffolding and the basement was built in parts. As the new floors were constructed, these were keyed in to the existing wall until the facade was adequately braced.

The size of the building versus the site was also a challenge, says Cretney, as there was little storage for rubble and it was difficult to keep the site clean.

It was also not possible to provide on-site parking and zoning laws allowed parking to be omitted. Despite the fact that the building sits in close proximity to some good inner city transport, all staff currently use their personal vehicles and parking is sourced in surrounding buildings.

Storage for bicycles, lockers, and a shower has been provided but the cycle lanes in Braamfontein have not been well established yet.

## OFF-GRID SOLUTIONS

The team wanted to take as many elements as possible off-grid, however the building is overshadowed by tall surrounding buildings, making solar panels impractical. It was possible to use a standard domestic solar geyser for hot water in the three kitchens and the shower, because solar geysers rely on UV light as well, explains Duckitt.

There is plenty of natural light and all artificial lighting comprises LEDs and low energy fluorescents with minimum lux levels for the office environment. These are combined with movement sensors. The windows are double-glazed and have automated blinds, which are linked to the building management system (BMS). They move up and down during the day to regulate the infiltration of direct sunlight and glare. Although it is not completely off-grid, it is a very “energy conscious building”, says Cretney.

The building is connected to the city gas supply, and conventional portable gas heaters can be “plugged” into a riser that connects to each floor. This makes winter heating both very efficient and economical. The Rinnai gas heaters use a very small

amount of electricity to power a fan that blows over the gas flame, so temperature regulation is easy, explains Cretney.

Unfortunately the building is not invulnerable to blackouts. "There is unfortunately no on-site power generation," says Cretney. "We looked at using trigeneration, which is a turbine that runs off gas, but the cost was about R1 million, which, in a construction budget of R8.5 million, is excessive." The building has high levels of natural light and the automated blind system can be overridden in the case of a power outage.

### MIXED MODE VENTILATION

Initially the team considered installing an energy-efficient air-conditioning system but the R1.4 million price tag was untenable. The result is a mixed mode system of natural ventilation and forced ventilation.

Unconditioned fresh air is pushed through a series of chimney stacks on each floor in order to provide the required number of air changes per hour, explains Cretney. Added to this, staff can open windows, which causes natural air movement as the air is pulled up through other chimney vents. "It's difficult to find a balance between acoustics [the noise of the city] and thermal comfort as the air temperature cannot be controlled exactly," says Duckitt.

The system will be monitored over the next few months, and having just come through the hottest

period, there have been relatively few complaints, he adds.

### WATER CONSERVATION

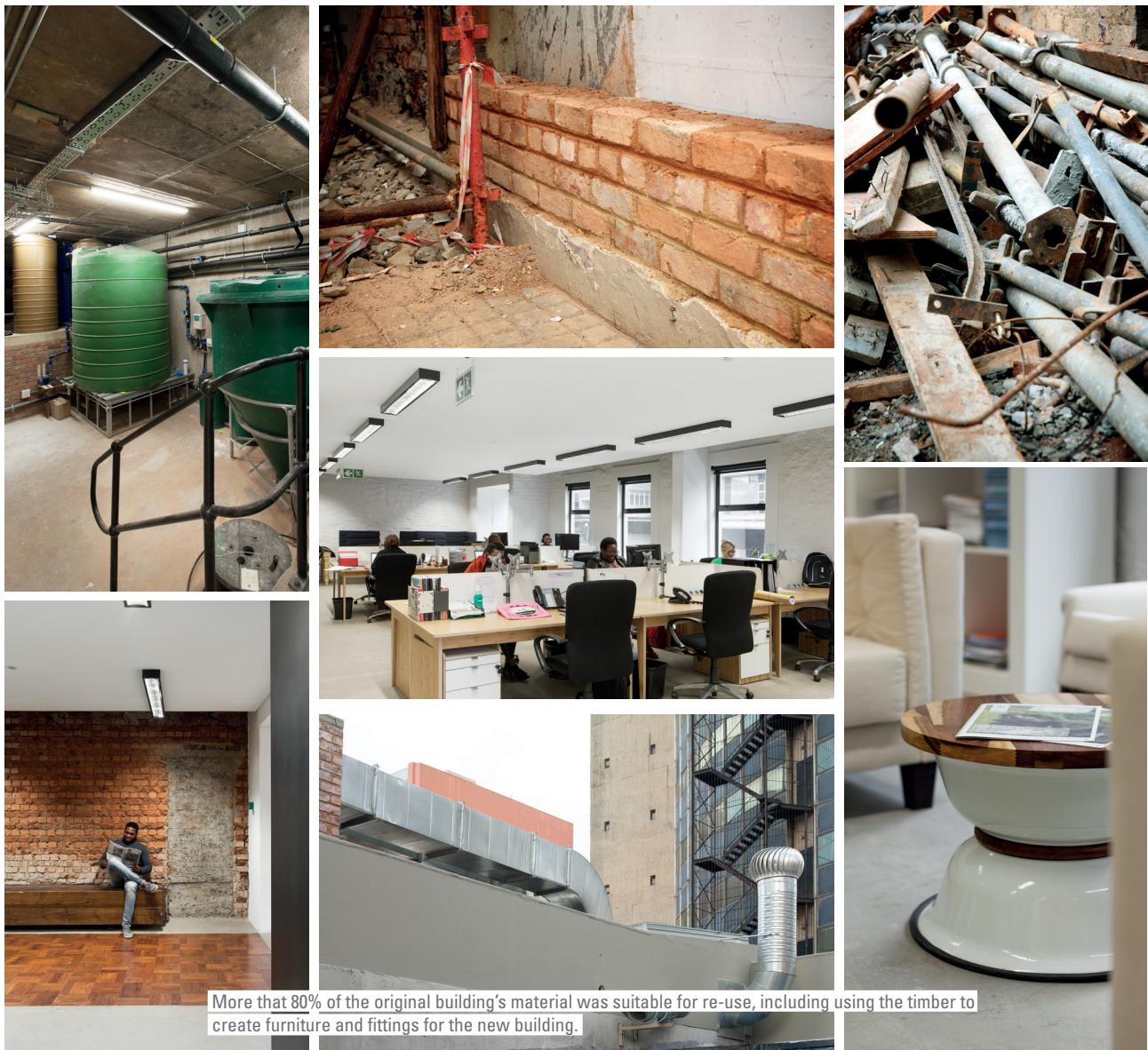
Another significant intervention is the black water treatment system in the building's basement - the first in South Africa installed in an urban environment, which means that none of the building's waste water goes back into the municipal sewerage system. The Lilliput system combined with a septic tank ensures water goes through a series of three chambers, and then moves on to an anaerobic digester. It flows through a further two filtration tanks before being stored and reused for flushing toilets. The system's input capacity is 6000l of waste water per day but due to the building currently being under occupied only 1000l – 1500l now flows through on a daily basis.

The anaerobic digesters operate optimally at full capacity so it takes time for the system to push out a fully purified end product, explains Cretney. "The water is currently the colour of pale ale craft beer but we are getting there," he adds. It takes some adjustment for the building's users to accept the colour of the water in their toilet bowls, however, "every litre flushed is a litre recovered", says Duckitt. An unexpected problem whereby a smell is being emitted into the building is being resolved by installing additional extraction in the basement. "The reason we spend a full year monitoring the systems



### NUTSHELL

**Location** • Corner Melle and De Korte streets, Braamfontein  
**Size of property** • 248m<sup>2</sup>  
**Construction Cost** • R8.5 million  
**Start** • November 2013  
**Completion** • Occupation January 2015



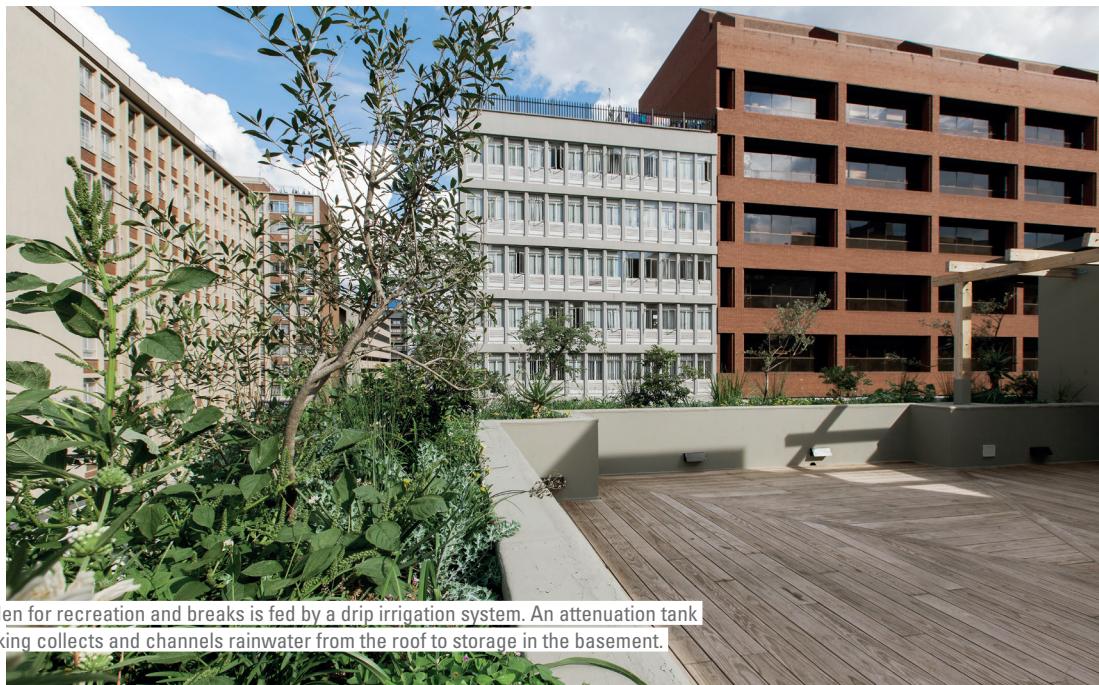
## SUSTAINABILITY FEATURES

- Existing facades retained and reinvented
- Deconstruction of existing building including brick, timber and corrugated sheeting
- Over 80% of materials reused in new building
- Broken bricks sent for crushing to make aggregate and other materials donated to the community
- Timber used to build furniture and fittings for new building
- Abundance of natural light
- Double-glazed windows
- LED lighting and low energy fittings
- Room movement sensors and automated blinds
- Mixed mode natural ventilation and forced ventilation
- Gas heating for winter
- Solar geyser
- Inner-city location near public transport routes; no parking provided on-site
- Cyclist facilities – storage, lockers and shower
- Planted roof garden for breaks and recreation
- Storm water harvesting used for irrigation on roof
- Drip irrigation for indigenous locally sourced plants
- 6000l capacity black water treatment system
- Non-pollutant and non-toxic materials and finishes

post construction is to resolve unforeseen issues like this one," explains Duckitt.

Although in theory the end product could be drinkable, municipal standards are stringent when it comes to regulations and the costs and risks far out-weigh the benefits. The building's potable water consumption is 171l per day, which, if compared to the consumption of a five-person household at an average of 650l per day, is a considerable saving, Duckitt adds. All sanitary ware is water efficient.

The only consumptive use of non-potable water is for the roof garden, which is fed by a drip irrigation system. An attenuation tank under the timber decking collects and channels rainwater from the roof and trafficable areas to storage in the basement. The black water system can also be topped up using



rainwater or municipal water (in an extreme case), as the BMS senses the level of water in the system to ensure it continues to function properly.

### OCCUPYING AND OPERATING A GREEN BUILDING

"To operate a green building requires the users to change behaviour and initially there is always resistance," says Duckitt. "Adapting to change takes time." The team will be monitoring the building for another year, through a full seasonal cycle, in order to "tweak the system and the users so that they work in harmony".

In comparison to the previous building, there are a lot more facilities, including boardrooms and recreational facilities on the roof. The indoor air quality is fresh and all materials are non-pollutant and free of toxins. Dean Muruven, WWF water source areas programme manager, based in the Braamfontein offices, says the central city location also has a special culture that the staff enjoy: "Owning a green building gives the employees a sense of pride as it feels like it brings us closer to our values as an organisation, particularly with some of

the unique features contained within our building." This has definitely increased productivity among the staff and the open plan office environment, which is filled with an abundance of natural light, has brought the WWF team closer together, he adds.

### CONCLUSION

The WWF building demonstrates dedication towards finding practical sustainable solutions that fit within a strict budget, without being constrained by it. The design team had to adapt and change the design to suit, in some instances opting less for technological solutions and more for passive design, and in so doing the project stayed largely within its construction budget of approximately R8.5 million, which was funded from the organisation's reserves and supplemented with applicable sustainable product and material sponsors.

The result is a building that disproves the idea that building green should be expensive. Furthermore, a green building translates into lower operating costs and a reduction of the intrinsic environmental impact of the building, which in turn confirms the organisation's values. ◊

### SOURCEBOOK

**Developer** • WWF-SA • Ian Goodwin • 021 657 6600 • [www.wwf.org.za](http://www.wwf.org.za)

**Tenant** • WWF-SA head of communications • Pedzi Gozo • 021 657 6600 • [www.wwf.org.za](http://www.wwf.org.za)

**Project manager and green consultant** • Bornman & Associates • Richard Duckitt • 021 914 5886 • [www.bmnaa.co.za](http://www.bmnaa.co.za)

**Architects** • Alive Architecture • Simon Cretney and Pieter-Ernst Maré • 011 513 4083 • [www.alive-architecture.co.za](http://www.alive-architecture.co.za)

**Structural and civil engineers** • TG Harrison • Tom Harrison • 011 787 4897 • [hdw@netactive.co.za](mailto:hdw@netactive.co.za)

**Environmental consultants** • Eco Impact Legal Consulting • Nicolaas Hanekom and Mark Duckitt • 021 671 1660 • [www.ecoimpact.co.za](http://www.ecoimpact.co.za)

**Main contractor** • Giuricich Bros Construction • Nicky Giuricich • 011 802 5821 • [www.giuricich.co.za](http://www.giuricich.co.za)

**Wet services design and supply** • Solar Power Installations • Gerard Ohlson De Fine • 079 899 4321 • [gerard@solarpowerinstallations.co.za](mailto:gerard@solarpowerinstallations.co.za)

**Electrical design and supply** • Standard Electrical • Gary Abrahams • 011 624 1010 • [gary@stanlec.co.za](mailto:gary@stanlec.co.za)