PILLARS OF EXCELLE

When a business provides solutions tackling some of the toughest elemental forces of nature, a holistic attitude emerges that thinks, behaves and builds in accordance with the triple bottom line.

WORDS KERRY DIMMER **PHOTOGRAPHY** DOOK (SUPPLIED)

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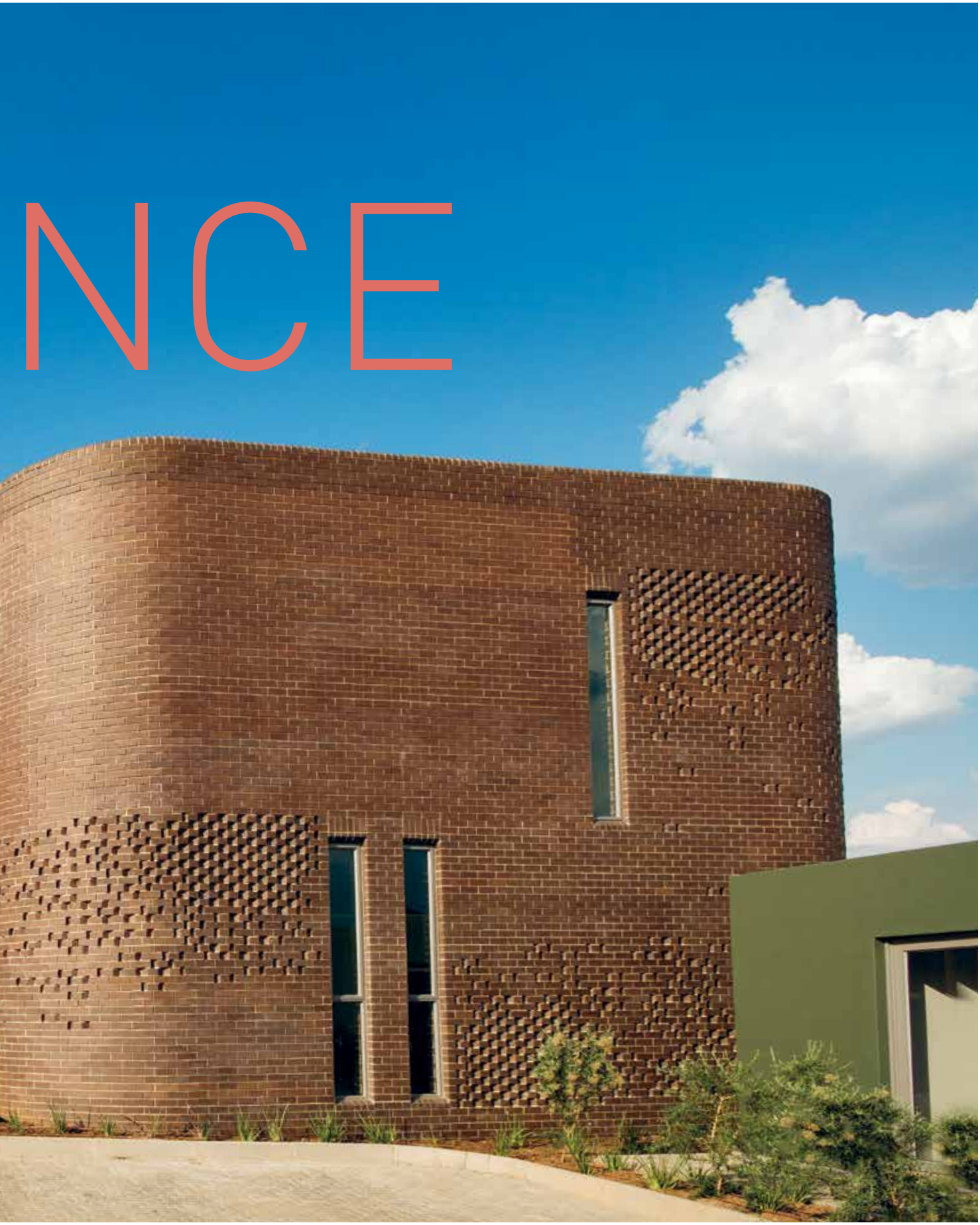

When spearheading the architectural design of I-CAT's flagship building, sited within the N4 Gateway Industrial Park in Pretoria, Earthworld Architects made it known the project would need to embrace its own sustainability mandate on three levels: ecological, economic and social. Fortunately, this aligns to the crux of its client's sustainable business.

I-CAT Environmental Solutions' list of services includes environmental licensing, auditing, classification, compliance, monitoring and assessments. The new office and warehouse premises thus needed to encompass the environmental ethos of the company and more.

Previously-fragmented business divisions could now be housed in a single building and adjacent warehouse, with the new site specifically chosen from a social perspective as it would reduce the transport impact for the majority of staff who reside in nearby Mamelodi; it is also close to the Mamelodi SOS Village, which is one of I-CAT's social responsibility beneficiaries.

One of the architects on the project, Rudie Botha, says creating a sustainable building is an organic process, and something that Earthworld is gaining a strong reputation for. "It is interesting to look at sustainability from the three perspectives we highlight, because one demands from the other, yet a balance must be maintained between them.

"We set out to create not just a building that would become a place where people work within an environmentally friendly designed structure, but one that would ultimately save money for the client," says Botha.

Conceptually the site lent itself to ensuring one building would shade the other, in this case the warehouse providing shade for the office from the west. The coolest side of the building, south, presented a perfect zone for a social courtyard, and naturally the north would provide mass light.

The climate and seasonal natural lighting inspired every aspect of Earthworld architects' lines on paper. "Orientation brings mass light into the building when it counts, with vast glazed window shading and louvres for the days when the equinox dictates otherwise," says Botha. "We specified as little artificial lighting as possible, and then only LEDs and CFLs."

It was, however, the skin of the building that received the greatest attention for this was to set the tone of the building envelope and be the first line of defence against undesirable climatic impacts. Structurally, if Earthworld was to concentrate on dampening heat, maximising light and factor in the three pillars of sustainability, the building needed some drama.

Botha says the basic design is that of a grid building with two floors. Aiming for a rammed earth aesthetic, the architects steered away from traditionally muddy applications, instead selecting an unusually dark onyx brick from Corobrick, which, when recess-jointed with a visible white sand, a weaving pattern emerged. "It was a tricky application, yet it provided gravitas for the look and feel we were aiming for. Foreman Bob Kreder (fondly referred to as Bob the Builder), was a great asset in this process, truly one of the last and great *Baumeisters*," says Botha.

Herman Post, project manager of J.C. van der Linde & Venter Projects, agrees the brickwork was a challenge as it required a "perfect level of work". He says: "The finish is extraordinary and credit must be given to the architects who visualised the outcome."

As the sustainability imperative evolved, the architects' sketches grew bolder with innovation for the 940m^2 office building. A courtyard between the office and the warehouse on the cooler southern

NUTSHELL

Location • 38 Amatole Road, N4 Gateway Park, Pretoria
Floor area • 1949m²
Start construction • November 2014
Project completion • August 2015

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side addresses the social pillar of sustainability on a tangible scale as it provides comfort for employees. A pergola feature under which a water feature trickles into a Koi pond that doubles as a bird bar, invites contemplation, shared lunches and communal interactions among building occupants.

For the client, an unexpected surprise is a roof garden that not only provides insulation and contributes to the view, but also serves to collect rainwater, which, along with other harvested water from the building's roofs, is fed into a 40 000-litre water tank buried beneath the courtyard. The tank is connected to a water filtration system that supplies the building with clean filtered water, the technology of which was developed by the client, I-CAT. Botha commends I-CAT for its innovation in this regard: "How better to showcase one of your core business systems and prove what can be achieved in the process of purification?"

Morné van Wyk, I-CAT technical manager, says aside from harvesting, the building remains connected municipally as a secondary feed. "We have a smart integrated PLC [programmable logic controller] system that controls all functions and detects volume in the underground sump/tank, which will always be our primary feed.

"From either one of the feeds, we clean, treat and purify the water utilising our existing technology, which is also offered to our clients. The water is contained in a buffer tank where it can be pumped to the building. Should the rainwater harvesting sump or tank and the buffer tank reach full capacity, the PLC controls a solenoid bypass value and the overflow of water is pumped into a secondary

10 000-litre holding tank behind the warehouse. This water is primarily used for irrigation."

Also behind the warehouse is a secondary small sump, used for the wash-bay. The run-off water is collected in the sump, pumped to a filtration system and cleaned for re-use at the wash-bay or irrigation depending on volume and need.

It's a similar situation with the energy usage and performance, which are a major determinant of sustainable performance. The premises remain connected to the municipal electricity grid but solar panels and PVs are the main source of power.

The solar PV system on the roof was designed and installed by Holms and Friends. A 50kWp grid-tied system feeds into the office grid, and will generate approximately 87 500kWh/annum. The 200 modules manufactured by SolarWorld come

1 & 2. A light and tranquil setting has been created. Interior sustainability considerations include low VOC recyclable carpets, greenery and recycling bins in the kitchens. **3.** The coolest side of the building presented a perfect zone for a social courtyard. With a water feature, Koi pond and bird bar, it invites contemplation, shared lunches and communal interactions.

with a 30-year linear performance guarantee.

Henning Holm, from Holms and Friends, says payback is around six years. Levelised cost of electricity equates to R0.53/kWh with maintenance, component replacement and VAT inclusive, but not including finance costs.

In almost all respects there were no problems encountered in building I-CAT's flagship, which, from start to finish took barely 10 months. The only cause for concern lay in the hands of project manager Post, who says there was an enormous amount of clay on-site. "It's difficult to remove clay, especially when you need to build layers for columns and foundations, but the engineers accounted for this, providing up to three metres of excavations. Obviously we needed to ensure excellent filtering of the clay, good shoring and a more intense focus on the safety features as a result, but overall it wasn't a serious hiccup."

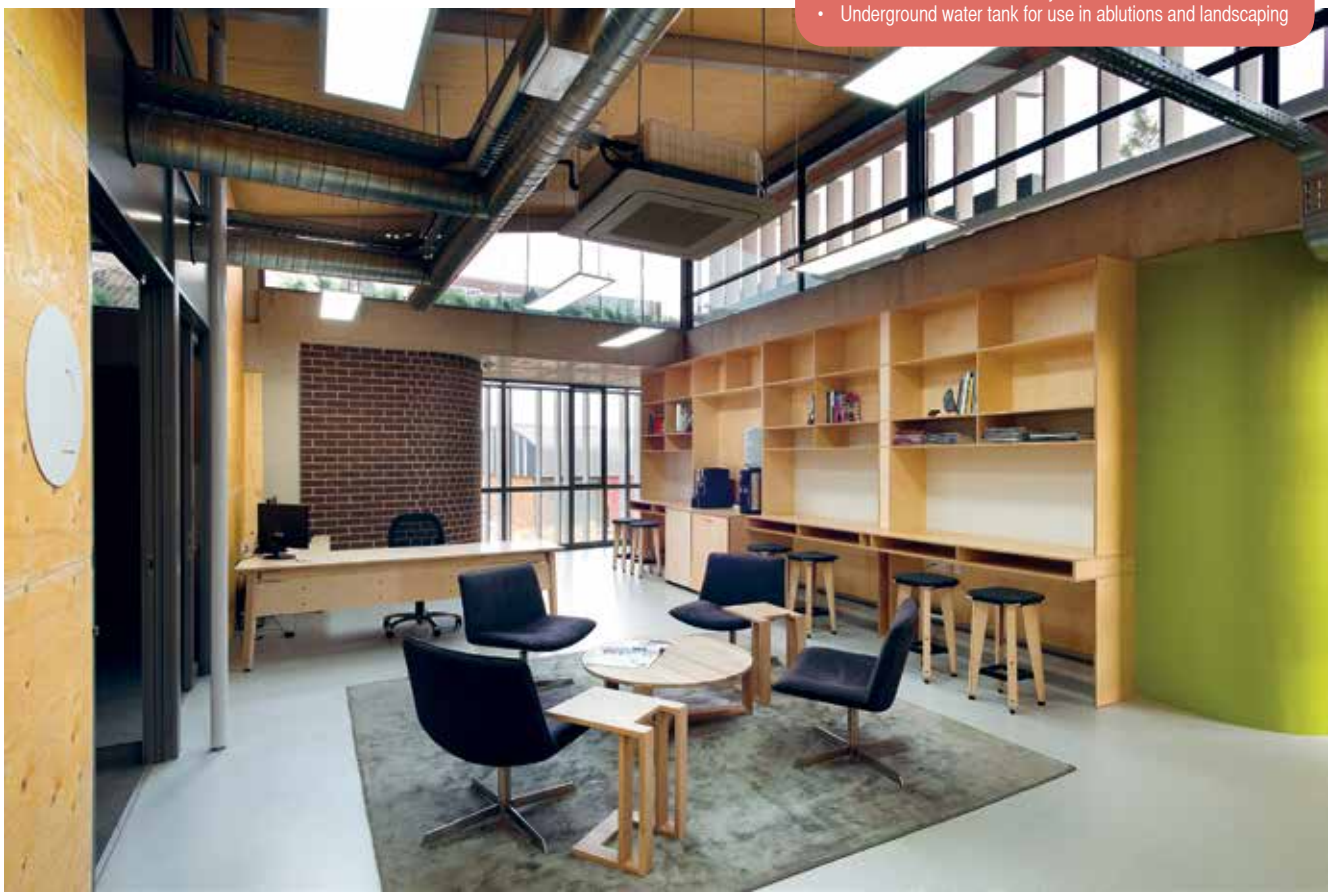
Post is particularly pleased to note the looser envelope of the warehouse build, which covers 1350m^2. Although there may be no particular outstanding features of warehousing – after all they generally tend to be steelwork and sheeting structures – Post believes the naturally ventilated roof and low perimeter louvers add to the quality of air and ideal temperature conditions inside.

LOOKING WITHIN

Speaking in-house is Hendrieka Raubenheimer, interior architect at Earthworld. Her task was to ensure the matrix of the sustainability pillars continued indoors, and she wanted to keep it simple. "A brick wall is a brick wall and I feel it needs to

SUSTAINABILITY FEATURES

- Thermal zoning of buildings
- Natural ventilation
- Solar hot water collectors and PV
- External shading devices and window fins, made from Nutec fibre cement boards, intercept solar radiation and protect against morning heat
- Roof overhangs for shade during summer
- Resistive insulation for sheet-metal roofs
- High thermal mass roof with plant growth
- Microclimatic design acts as climatic moderator for internal environments
- Low energy usage lighting and low-glare diffusers
- Occupancy sensors to control lighting
- Roof area water conservancy
- Underground water tank for use in ablutions and landscaping



Plywood furniture items throughout the building were specified as these were easy to assemble on-site, and the precise and energy efficient manufacturing processes ticked sustainability boxes, including economic value.

1. As little artificial lighting as possible was specified. Orientation brings mass light into the building, with glazed window shading and louvres. **2.** The clay brick facade adds drama yet sets the tone for simple and real interior materials and finishes.

be celebrated for what it is instead of coating it with excessive finishes that suggests it needs to be hidden. I like to keep things honest and real because honesty really does imply sustainability.

"When you confront sustainability every tiny detail is examined on many levels. That includes recyclability, longevity – which is often overlooked – quality, the manufacturing process, reusability, material choice and so on. The cradle-to-grave approach must be taken seriously," Raubenheimer says.

"I am fond of looking at the lifecycle of the product, not just its end use, but how much energy was consumed in the development. The choices of the interior must take into account form and function, and that explains why I was unable to resist plywood furniture flat packs from Raw Studios for entire bulk furniture items throughout the building. Easy to assemble on-site, the precise and energy efficient manufacturing processes ticked all my sustainability boxes, including economic value."

Environmentally sustainable considerations further included low VOC recyclable carpets, greenery and recycling bins in the kitchens. Ecophon suspended ceilings dampen sound in the meeting areas and contribute to the creation of a pleasant working environment. "It is a light and tranquil setting," says Raubenheimer.

Botha points out when it comes to sustainability, the lines do blur between interior and exterior architecture, which is what ultimately creates the "natural shell of a building".

The shell, in the case of I-CAT's building, is where the romance happens, in Botha's opinion. "The building's roof overhang, combined with striking round-shaped steel columns, hide small LED lights that shine down onto the concrete window sill at night. The shimmer is impossible to ignore. It adds a rhythm to the elevation," says Botha. During the day the drama is focused around the massive brick facade that forms a network of bricks that dissolve into punched window openings.

SOURCEBOOK

Architects • Earthworld Architects • external • Braam de Villiers and Rudie Botha • interiors • Hendrieka Raubenheimer • www.ewarch.co.za • 012 346 5400
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