

CARAVAN SITE UPGRADE

A caravan park project that won second prize at the Holcim Awards for Sustainable Construction (Africa and the Middle East) last year.

edge of the escarpment, about halfway between Cape Town and Springbok. Historical stone ruins dot the countryside, reflecting a tradition of dry-packed stone construction. Climatically well suited to local temperature extremes, many examples of flat earthen roof buildings can still be found in the area. Both circular and square elements are reflected in the dominant typologies unique to the area. Examples include stone cones, rondavel huts, threshing floors, rainwater tanks, the lean-to and the traditional barn.

In a contemporary interpretation of these humble forms, the concept of the planted roof lean-to type structures (intersected by

tapering stone cones) was born. Succulent planted roofs are used to celebrate the area's unique biodiversity, while cones of stone form anchors to the land and its tradition of sandstone building.

TECHNICAL DETAILS

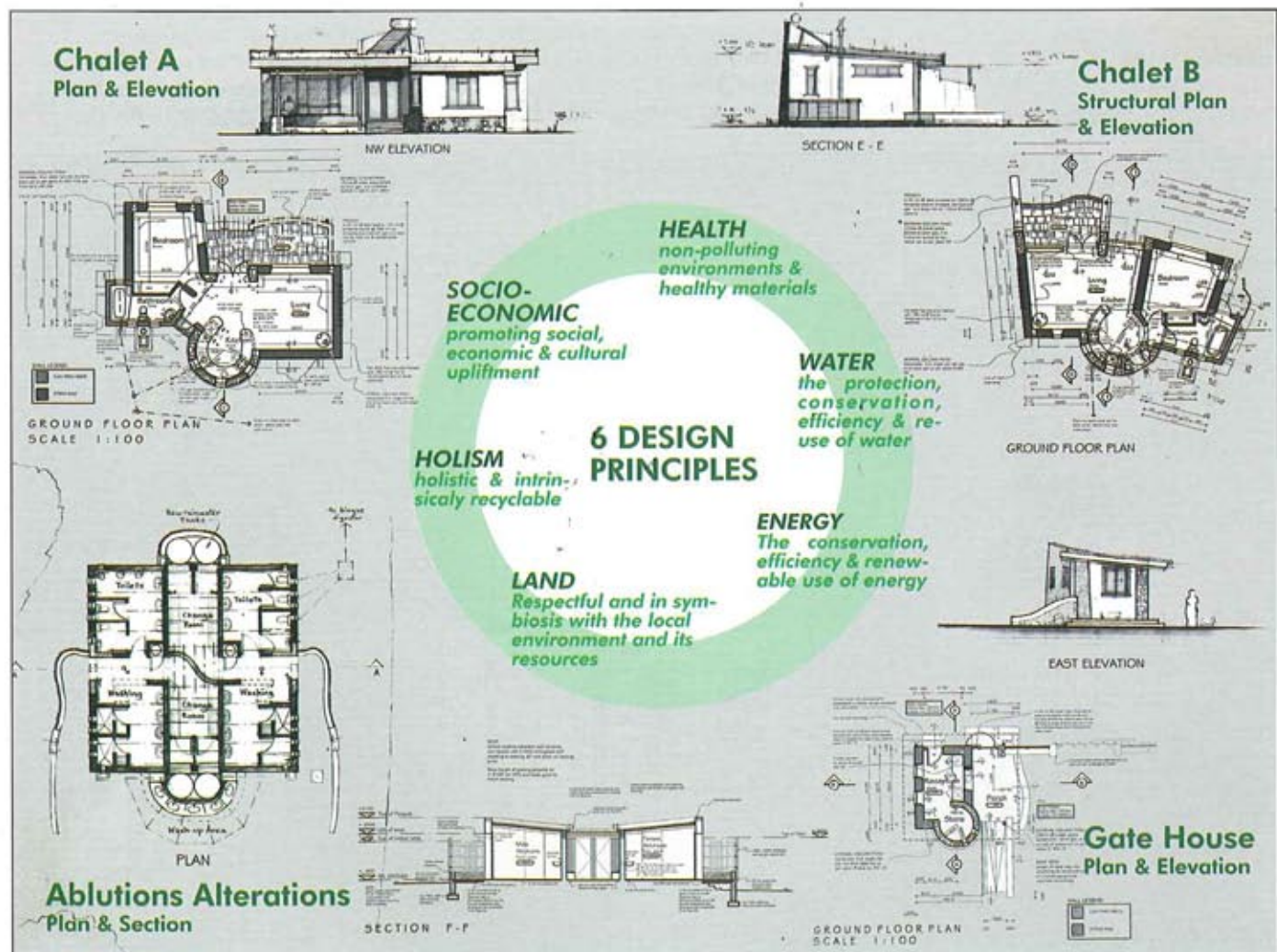
New buildings are going to be hybrids of natural materials:

- Foundations: a rubble trench/French drain, covered with a concrete strip, stone plinth, gravel and a ladder plate.
- Walls: sandstone, timber pole structures, with straw bale infill, plastered with a clay-lime mix and conventional baked bricks

around the bathroom.

- Roof: waterproof shutter board covered with gravel and planted with succulents.
- Ceilings: Spanish reeds (an invasive alien clogging our waterways).

All timber is treated with boron, which is non-toxic to mammals, and finished with natural oils (developed from linseed oil, natural essences and organic turpentine). Wherever possible, timber cut from invasive aliens, such as bluegum and poplar, is used. Saplings used for screen walls are ponded in water for six weeks to remove all starch – a source of food for insects. Buildings are orientated to take



advantage of thermal gains. The straw bale infill and planted roofs are high in thermal mass and insulation properties, adding to the passive solar design elements of the building.

Grey water is distributed to sub-surface irrigation mulch pits. Rainwater will be collected from the roof of the ablution blocks once the asbestos roof has been replaced with corrugated iron. The chalets will be equipped with waterless, composting toilets that yield compost for working into the landscaping. All taps will be fitted with tap aerators from AquaSmart for efficient water use and low flow showerheads will reduce hot water demands.

The ablution blocks will be fitted with high-performance evacuated tube solar geysers which, when fitted with small booster tanks, can function fully at sub-zero temperatures as long as they're exposed to daylight. They're ideal for coping with high usage levels. The chalets will be fitted with the more traditional flatbed, close-couple collectors for solar water heating, which will be partly screened by a stone cone that punctuates the roof plane.

CURRENT STATUS

The project was set to begin construction at the end of 2004. As per legislation, it was

required to go to public tender. One tenderer, who was not a local representative, responded with overinflated prices.

The current tender process is onerous for small-scale and local contractors who wish to compete; however, the ethos of the project required the use of local contractors, labour and materials. With the future of the project uncertain, the Development Bank of Southern Africa (DBSA) Knowledge Management Division's construction and development specialist Glenn Havemann recommended a community-based procurement process that involves the community in decision-making and implementation processes and forms the basis for a construction-based social contract in line with the principles of sustainable development.

Typically, the first step is to formulate terms of reference that outline the roles of all relevant contractors. In this case, a clerk of works/onsite mentor with natural building skills was appointed to procure materials, help local small-scale artisans and contractors to quote for jobs, manage the site and provide onsite training. The quantity surveyor must prepare a material schedule, which will be used as a procurement list for project management purposes.

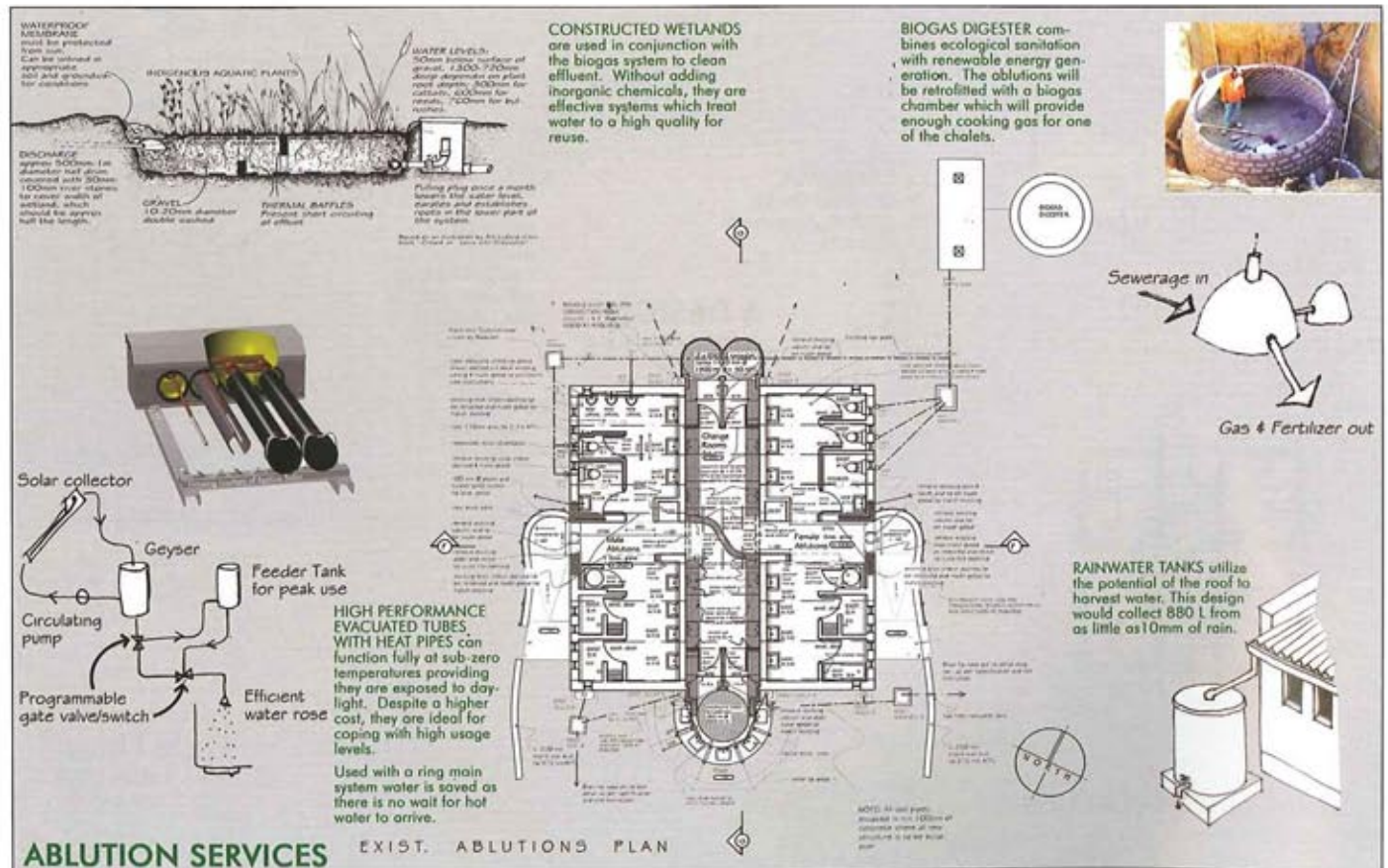
On 14 June 2006, a community handover

meeting was held to kick-off construction. All artisans, aspiring artisans and local suppliers were invited to take advantage of the job opportunities provided by the project.

CONCLUSION

This process has offered some valuable lessons on sustainable building principles grounded in sound practice. The process has allowed maximum community involvement, skills transfer and local economic development. In addition, the use of natural building materials has hugely diminished the ecological footprint and impact on global warming traditionally associated with conventional construction methods and materials.

It's imperative that the money spent in an area benefits the target community and is not filtered to industries in other parts of the country. Too often empowerment projects teach skills that require the 'import' of materials and technology. The result is that a percentage of the money spent in the community always leaves the community. The use of local materials ensures that all the money stays in the hands of the community and that the materials are accessible, affordable and appropriate. The use of local materials thereby ensures micro-economic development. ■



LOCAL VERNACULAR TYPOLOGIES

CIRCULAR ELEMENTS

CONES - CORBELLED HOUSES
These stone structures were probably the first permanent buildings built by the early white settlers, who were linked by a lack of available timber. A few of these structures can still be found in this area.

BONDVEL HUTS
Originating from the finished domes of the Bondvel people, the finished form is a tall, conical, cone-like structure with a flat top, commonly used as a shelter.

KOOKSKERM "COOKING SCREEN"
Traditional outdoor kitchens made of local natural material, these forms are still widely used by descendants of the early Bondvels.

THRASHING FLOOR & RAINWATER TANK
While many of the thrashing floors have been converted to other uses, they are, together with the round reservoir tanks, a common feature of the landscape.

RECTANGULAR ELEMENTS

BASH
Many of the vernacular buildings are based on simple rectangular forms, and are built with local sandstone and clay-walled finish work.

LEAN TO
Humble lean-to type structures are typically built with mud, stone, walls and poles, and mud walls. More recently the mud walls have been replaced with corrugated iron and with one more typically built of concrete block.

MUD ROOF
Many examples of flat surface mud buildings - you still find them in this area. Characteristically well suited to the local temperature extremes, these buildings were a major source of inspiration for the project.

"GENIUS LOCI" - SPIRIT OF THE PLACE

CONCEPT - THE CIRCLE AND THE RECTANGLE
Drawing inspiration from the rich cultural context, it became apparent that the circle and the rectangle were very dominant forms. In a contemporary interpretation of these humble forms the concept of a planted roof was born to type structures introduced by reusing stone cones and boms.

Successful planted roofs celebrate the great unique biodiversity while points of stone are anchored to the land and its tradition of sandstone building.

SUCCULENTS FOR PLANTED ROOFS

PLANTED ROOF PROTECTS BIODIVERSITY

The process has allowed maximum community involvement, skills transfer and local economic development.

SOLAR HOT WATER CLOSE COUPLE COLLECTORS were used on the chalets, being appropriate for single family dwellings. They showcase a low-cost, reliable South African product. According to Solar Dome, the payback period on these panels is 3 - 4 yrs.

Close Couple Saving Calculations:
Taking into consideration a true north facing panel and based on an average total solar radiation of 2117 kWh/m² per year (Cape Town Weather Bureau).

Assuming 70% efficiency:
1m² generates 2117x0.70= 1481.9 kWh/m². (Ref: Solar Dome, Cape Town)
Given an electricity cost of R0.40 c per kWh
Projected annual saving per m² = 1481.9 x 0.4 = R 592.76 per m².

Based on the above figure, a 150 litre system (2.3m²) would save **R 1363.35 per year**

The total cost for the above installation less geyser cost would be:
R 6 535 - R 2 700 (price of a conventional geyser)
= R 3 835 + labour
Labour @ approx R1000
= R 4 835

Therefore payback period = final cost + by total savings per year
= R 4 835 ÷ R 1363.35
= **3.5 years payback period.**

CHALET SERVICES

PHOTOVOLTAIC PANELS can be used to provide power for lighting. Currently the national power supply company, ESKOM, will not allow independent power producers. Given batteries' environmental hazards, provision has been made for future installation once ESKOM has lifted restrictions.

CHALET A DRAINAGE LAYOUT PLAN

Enviro 100 dry composting toilet by "Enviro options"

Gully 3

Soopt 4 with gully trap

Soopt 4

Soopt 3

All soil pipes to be min 1.0m away from building/foot walls

New gravel road to be graded with existing tennis court gravel and domesticated with rocks at 400 c/s

Enviro 100 dry composting toilet by "Enviro"

Gully 1

Soopt 1

Gully 2 with gully trap

Soopt 2

CHALET 1A to future phase 2

CHALET 1A

CHALET 2A

CHALET 3A

Parking bay

BRANCHED DRAIN GREYWATER SUBSURFACE IRRIGATION is simple, low maintenance and easy to install. It offers an inexpensive, generic, alternative to commercial systems and can be made using recycled parts. The long term health of the soil will be monitored by the Nieuwoudville Eco Club

Control stand prevents water from overflowing
Control only to bottom

100% Recycled plastic
Recycled & green

Red drum placed upside down on rocks

Plush

DRY COMPOSTING TOILETS are particularly appropriate in Nieuwoudville's arid climate which receives only 300-400mm of rain p.a.

This local product has a manually operated conveyor belt. It works aerobically to break down pathogens. In contrast to conventional systems it supports the nutrient cycle.