

2010

FIFA World Cup

Peter Mokaba Stadium





By mid-2009, construction of the Peter Mokaba Stadium in Polokwane was progressing rapidly. As a match venue for the 2010 FIFA World Cup, the stadium's sustainability performance, from an environmental, social and economic point of view, was top of mind. Few people, though, were aware of the behind-the-scenes efforts to ensure this stadium would meet the highest sustainability standards.

As one of South Africa's 2010 FIFA World Cup match venues, Peter Mokaba Stadium – with its baobab-inspired roof supports – is an impressive structure. As is the case with all 2010 match and training venues, members of the project team for Peter Mokaba Stadium have gone to great lengths to ensure that the new facility boasts cutting-edge and environmentally appropriate features. But is this stadium meeting best environmental-performance standards? Has it been designed in line with “green building” and sustainability principles?

To answer these questions, the South African Department of Environmental Affairs, through the Urban Environmental Programme (UEMP), which is funded by the Royal Danish Embassy, commissioned a review of the greening status of various FIFA World Cup stadia – official match stadia and training venues. In the case of Peter Mokaba Stadium, the review was done according to the CSIR's Sustainable Building Assessment Tool (SBAT); measuring the environmental, social and economic performance of the facility – in terms of design and its operation.

In total, five of South Africa's FIFA World Cup match and training venues were reviewed in the UEMP initiative:

1. Green Point Stadium (Cape Town)
2. Moses Mabhida Stadium (Durban)
3. Athlone Stadium (Cape Town)
4. Royal Bafokeng Stadium (Rustenburg)
5. Peter Mokaba Stadium (Polokwane)

***This booklet tells the story of
Peter Mokaba Stadium.***



Peter Mokaba Stadium goes 'green'

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Robbie Sanrock

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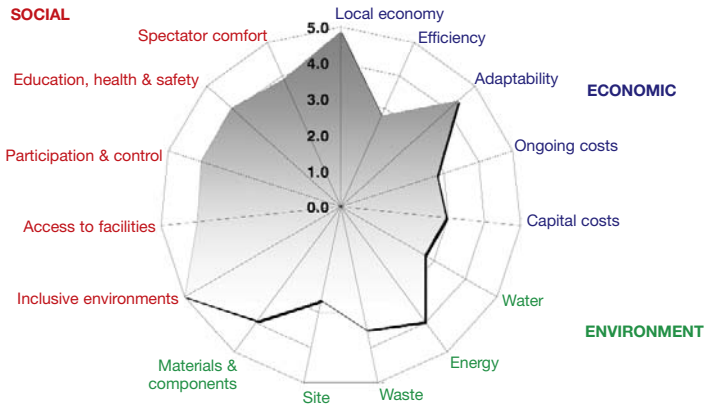


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Key asset for Polokwane

Following an extensive SBAT review of Peter Mokaba Stadium's sustainability performance, the assessment team has concluded that the stadium's design approach is balanced – equal emphasis has been placed on economic, environmental and social criteria.

The resultant facility (completed by the close of 2009) is, therefore, one of Polokwane's prime assets; catering for rugby and soccer; seating as many as 45 000 spectators. Situated on a 50 ha sports precinct, the stadium has been developed in line with Polokwane's Spatial Development Framework (SDF) and Integrated Development Plan (IDP).



Triple-bottom-line approach

In terms of SBAT, the performance of Peter Mokaba Stadium was measured in relation to economic, environmental and social criteria. In certain aspects, the performance of the stadium was found to be very good (especially in terms of 'local economy' and 'inclusive environments'). The overall rating was good – a score of 3,4 – and balanced between the three aspects of sustainability. Above-average scores were recorded for 'adaptability', 'energy', 'spectator comfort', 'inclusive environment' and 'participation and control'. Below-average scores related to 'site', 'education' and 'health and safety'.

Stadium performance assessed

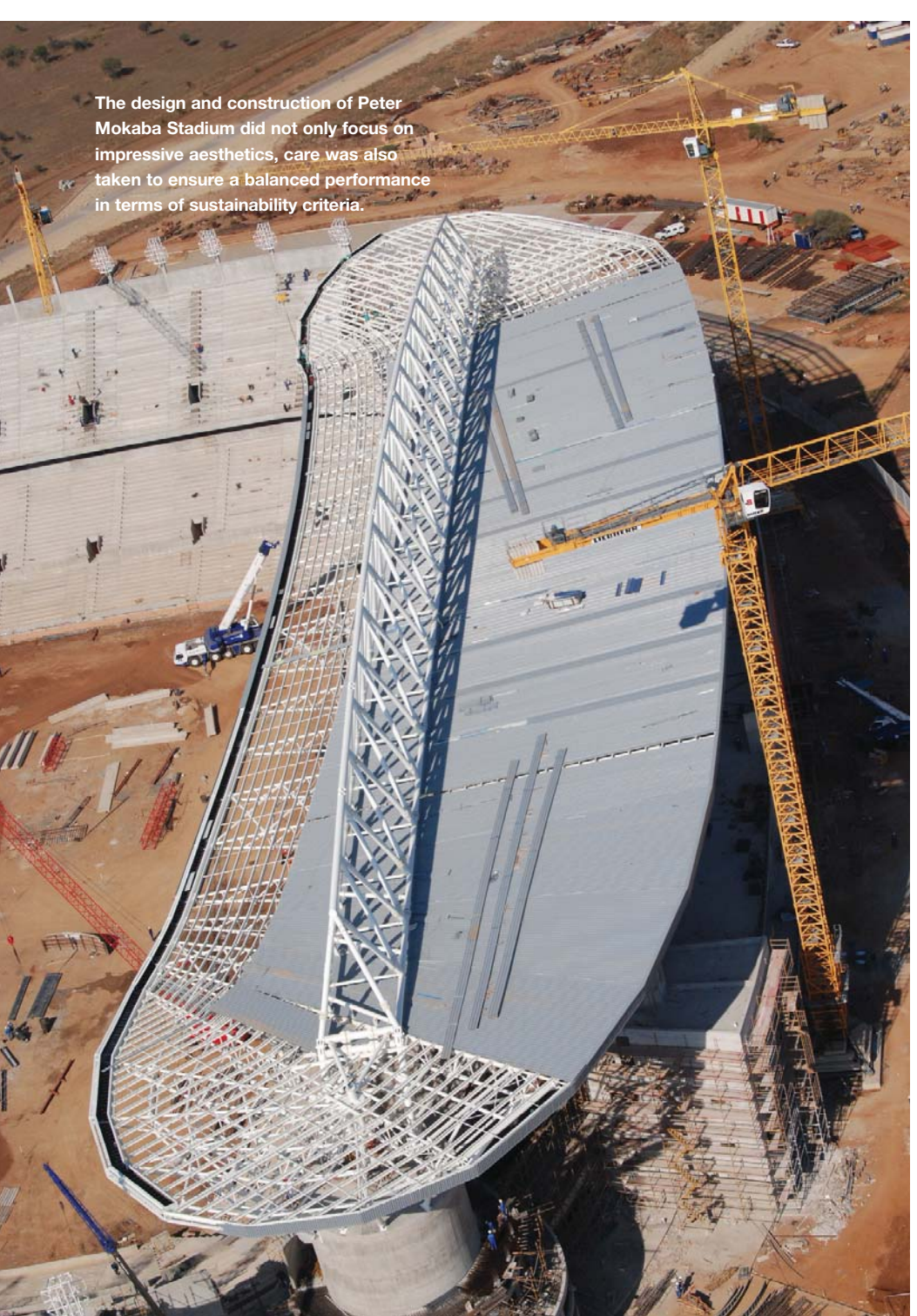
To reach their conclusions, members of the sustainability review team assessed Peter Mokaba Stadium in accordance with the CSIR's Sustainable Building Assessment Tool (SBAT). As sustainability deals not only with environmental performance but also social and economic issues, the SBAT tool embraces the triple-bottom-line approach. This is significantly different from the approach followed in 2006. Germany's Green Goal initiative for the 2006 FIFA World Cup focused exclusively on environmental issues at the time.

SBAT criteria

The key performance areas measured against the SBAT tool comprised:

Economy:	Environment:	Social:
<p>local economy Local labour, local building materials, local components and fittings, local furniture, as well as maintenance.</p> <p>efficiency Capacity, occupancy, space per occupant, shared parking and multiple use.</p> <p>adaptability Alternative uses, external space, services, as well as media and suite flexibility.</p> <p>ongoing costs Water and energy consumption, cost centres, maintenance and cleaning, and facilities management.</p> <p>capital costs Training, labour intensity, support of small, medium and macro enterprises, sustainable technology, and private-sector funding.</p>	<p>water Rainwater, water efficiency, run-off, greywater and planting.</p> <p>energy Location, passive environmental control, energy efficiency, control and building-management system, and renewable energy.</p> <p>waste Waste-management facilities, waste minimisation, demolition and construction waste.</p> <p>site Brownfield site, neighbouring buildings, vegetation, construction process and landscape inputs.</p> <p>materials and components Roof, concrete, roof efficiency, superstructure efficiency and hazardous materials.</p>	<p>occupant comfort Shading, ventilation, large screen and crowding, proximity.</p> <p>inclusive environments Transport, 'way finding,' space, toilets and distribution.</p> <p>access to facilities Accommodation, banking, pedestrian and cycle routes, and food and drink.</p> <p>participation and control Environmental control, role players, social spaces, sharing access and local community.</p> <p>education, health and safety Education, website, health, safety and security.</p>

The design and construction of Peter Mokaba Stadium did not only focus on impressive aesthetics, care was also taken to ensure a balanced performance in terms of sustainability criteria.



Robbie Sanrock

Economic impact amplified

At Peter Mokaba Stadium, a positive impact on the local economy was a top priority. Noteworthy interventions to maximise the economic performance of the stadium included:

Local economy

- 58% of site workers (employed by the main contractor and subcontractors) sourced from within 50 km of the site
- 95% of building materials sourced within South Africa
- 90% of maintenance and repairs will be handled by local small businesses in future

Efficiency

- The stadium will be used for sports events at least once a week
- Some parking bays will be shared with surrounding community facilities and offices on non-match days
- Various non-stadium functions accommodated, such as executive boxes, double up as offices, dedicated office space, showrooms and exhibition space – the press theatre will double up as a conference and presentation venue



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As many of the construction workers live within a 50 km radius of Peter Mokaba Stadium, the local community has benefited financially.

Adaptability

- Soccer, rugby and cultural events accommodated
- VIP suites adaptable for other uses

Ongoing costs

- Low-maintenance finishes

Capital costs

- R750 000 spent on training of site workers
- Empowerment value spent by contractor amounts to 56% of the total contract

Environment protected

Negative environmental impacts were avoided at all cost – during construction and with operation of the stadium in mind. Noteworthy interventions included water- and energy-efficiency initiatives.

Water

- Rainwater harvested off the pitch, stored in a 50 m³ underground tank and reused for irrigation purposes
- Stormwater harvested, stored in a retention pond and reused for irrigation purposes
- Water-efficient fittings include low-flush cisterns (6 ℓ/flush), low-flush urinals (1 ℓ/flush) and low-flow shower heads.
- Automatic pitch and landscape irrigation linked to a rain sensor
- Permeable surfaces in landscaped areas
- Indigenous planting (96%) with low water requirements
- Shredded coconut husks, mixed into the pitch's growing medium, reduce the need for irrigation

Energy

- Close-by public transport facilities (railway station, airport and “park-a-ride”) reduce the reliance on energy-inefficient private cars
- Cross-ventilation in concourse areas
- High-level louvres and low-level openings in eastern entrance lobby facilitate natural ventilation
- A two-fold building-management system monitors and controls energy consumption – one dedicated to the mechanical air-conditioning systems and the other to the electrical system

Waste

- Colour-coded bins for separate waste streams
- Excavated rock crushed on site and reused as fill material
- Previously dumped construction waste on site blended with excavated material and used as bulk fill material.



Efficient use of the earth's resources played an important part in the design of Peter Mokaba Stadium. The concrete mix, for example, contains 30% recycled waste in the form of fly ash.

Site

- Dust minimised
- Environmental consultant monitored construction activities
- Roof designed to minimise light and noise pollution
- Speed limit and restricted routes for construction vehicles
- More than 400 new indigenous trees planted on the site and surrounding streets
- The landscape will require minimal mechanical maintenance

Materials and components

- Concrete contains 30% fly ash

People considered

Spectators and the local community were considered in the design and construction of the stadium. Noteworthy aspects include accessibility for disabled people and non-motorised transport routes.

Occupant comfort

- 11 000 seats shaded at midday
- High-level opening between stand and roof facilitates natural ventilation
- Cross-ventilation in concourses
- 70% of spectators seated within FIFA's 90 m optimal viewing distance
- All spectators seated within 190 m maximum viewing distance

Inclusive environments

- Parking for disabled people 60 m from seating
- All three levels of stadium accessible to disabled people
- Disabled seating within 20 m of disabled toilets and catering facilities

Access to facilities

- Tree-lined, non-motorised transport routes provide a link between the stadium and surrounding community



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Most spectators are seated within FIFA's 90 m optimal viewing distance.

Participation and control

- Regular meetings between key stakeholders and municipality's strategic business units

Education, health and safety

- All site workers received HIV/Aids awareness training
- 20% of site workers received health and safety training

Balanced approach

The SBAT review of Peter Mokaba Stadium showed a balanced approach. The three key performance areas of economy, environment and society were handled equally and the pitfall of prioritising one area above another was avoided.

The overall rating was deemed to be 'good' - (a score of 3,4). Ratings for the individual areas were as follows:

Economy:	3,8
Environment:	3,0
Society:	3,4



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Spectators and players alike can look forward to a world-class stadium.

The professional design team

Client:

Polokwane Municipality

Professional team:

Project manager: Seco/Betts Townsend JV

Architects: AFL and Prism Architects

Quantity surveyor: KC Maiwashe & Associates

Civil engineer: Aurecon South Africa

Structural engineers: SKM and Aurecon South Africa

Wet services engineer: Kyle & Associates

Landscape architect: NLA Bagale Mohlolo JV

Safety and security consultant: Invula Risk Management

Environmental consultant: IW Terblanche EnviroXcellence JV

Traffic engineer: Siyazi

Contractors:

Contractor: WBHO Paul's Building Joint Venture

The sustainability review team:

GREEN by DESIGN WSP

PJ Carew Consulting

CSIR

Funding:

Royal Danish Embassy

Publication of this booklet by:

Brooke Patrick Publications, publisher of *Urban Green File*, *Architechnology* and *JFM Sports Facilities* magazines and e-mail bulletins, among others.

This booklet is the fifth in a series of six covering five participating 2010 FIFA World Cup stadia and training venues, including an executive summary.

A booklet on lessons learned relating to the greening of the stadia, as well as the Sustainable Building Assessment Tool is also available.

For a copy of this booklet:

Visit the UEMP website: www.uemp.org.za

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Prism Architects



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By June 2009, the vision for Peter Mokaba Stadium, designed by AFL and Prism Architects, was materialising.



Behind the scenes, considerable work has been done to ensure that the sustainability vision for Peter Mokaba Stadium is realised. Part of this vision includes a multifunctional stadium that is also environment-friendly in its efficient use of water and energy. Learn how Polokwane Municipality has worked towards this goal.

Robbie Sanrock



environmental affairs
Department
Environmental Affairs
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Urban Environmental Management Programme

