



tourism

Department:
Tourism
REPUBLIC OF SOUTH AFRICA



SARAO

South African Radio
Astronomy Observatory

SARAO CARNARVON SCIENCE EXPLORATORIUM

SCOPE OF WORKS

Document number	SSA-6000-000-005
Revision	01
Classification	Commercial in Confidence
Prepared By	Gordon Metz
Approval Date	31 August 2022

Organisation	:	NRF (National Research Foundation)
Facility	:	SARAO (South African Radio Astronomy Observatory)
Project	:	Carnarvon Science Exploratorium
Document Type	:	Scope Of Works
Function/Discipline	:	PMO

DOCUMENT APPROVALS

	Name	Designation	Affiliation	Date	Signature
Prepared By	G. Metz	Specialist Consultant			
Reviewed By:	Y. Balfour	Project Manager	SARAO		
Approved By	A. Syce	Head: Hosting	SARAO		
Approved By	S. Monyayi	Acting: PMO Manager	SARAO		
Approved By	K. Phasiwe	Head: Communication & Science Engagement	SARAO		
Approved By	F. Kapp	Acting Head: Engineering	SARAO		
Approved By	A. Tiplady	Deputy Managing Director: Strategy and Partnerships	SARAO		

DOCUMENT HISTORY

Revision	Date Of Issue	Prepared By	Comments (e.g. ECN Number or changes to document)

DOCUMENT DISTRIBUTION

Publish in eB and Distribute to all signatories on the document and the relevant line managers.

DOCUMENT SOFTWARE

Package		Version	Filename
Word Processor	Ms Word	Word 2007	SSA-0005C-001 Rev 01

COMPANY DETAILS

Name	SARAO, Johannesburg Office (Observatory, Gauteng)	SARAO, Cape Town Office (Black River Park, Western Cape)	SARAO, HartRAO (Hartebeeshoek, Gauteng)	SARAO, Karoo Astronomy Reserve (Carnarvon, Northern Cape)
Physical / Postal Address	118A Gill Street Observatory Johannesburg 2183, South Africa	2 Fir Street (North gate entrance) Observatory Cape Town	P.O. Box 443, Krugersdorp, 1740, South Africa	Posbus 69, Carnarvon, 8925, South Africa

SARAO SCOPE OF WORKS DOCUMENT	Doc No:	SSA6000-000-005
	Rev No:	01

		7925, South Africa		
Tel.	27 11 268 3400	+27 21 506 7300	+27 12 301 3100	+27 21 506 7300
Fax.	27 11 442 2454	+27 21 506 7375	+27 12 301 3300	+27 86 538 6836
Website	www.sarao.ac.za	www.sarao.ac.za	www.hartrao.ac.za	www.sarao.ac.za

TABLE OF CONTENTS

1	INTRODUCTION	4
2	Purpose	4
3	REFERENCES	4
4	BACKGROUND	5
5	ASSUMPTIONS	5
6	LOCATION	5
7	THE HIGH-END VISION & CONCEPT FOR THE VISITOR CENTRE	6
8	THE CONCEPT FOR THE VISITOR CENTRE SITE AND BUILDING	7

ABBREVIATIONS

SKA	Square Kilometre Array	etc	Etcetera
SARAO	South African Radio Astronomy Observatory	PMP	Project Management Plan
DSP	Digital Signal Processing	SEMP	Systems Engineering Management Plan
PI	Principal Investigator		
SCM	Supply Chain Management		
e.g.	For example		

1 INTRODUCTION

The South African Radio Astronomy Observatory (SARAO) is the business unit of the National Research Foundation (NRF) that houses and operates South Africa's national radio telescope shared facilities, including the MeerKAT, KAT-7, and Hartbeeshoek 26-m radio telescopes. As a member of the international effort to build the Square Kilometre Array (SKA), which will be the world's largest radio telescope, South Africa (through the NRF's business units) is responsible for the construction and operation of the MeerKAT precursor telescope; for hosting the SKA Mid Frequency telescope; and for implementation of the African VLBI Network.

Besides offices in Johannesburg and Cape Town, SARAO occupies the radio-controlled SKA host site in the Karoo, 90km from Carnarvon in the Northern Cape, which hosts the Square Kilometre Array mid-frequency telescopes, MeerKAT, and KAT-7 radio telescope installations, as well as a number of guest instruments, including the HERA telescope.

SARAO has embarked on an initiative to establish an SKA Visitor Centre to be located in Carnarvon. The intention is for the Carnarvon SKA Visitor Centre (CSVC) to showcase the KAT-7, MeerKAT and SKA projects, as well as other local attractions, and particularly those related to the natural and human history of the Carnarvon area and region. The exhibition content, through state-of-the-art interactive displays, will explain and demonstrate the difference between optical and radio telescopes, and provide an overview of the KAT-7, MeerKAT and SKA projects including guest instruments in the area. It is also intended for the CSVC project to support and promote sustainable tourism growth and educational awareness in the Karoo Rural Node. Furthermore, the CSVC should be structured and equipped to facilitate the conceptualization and generation of new content to respond to the changing needs of the visitors, and for the benefit of other science centres across the country and internationally. Importantly, the Centre should be a place where educational and outreach activities are hosted, and outreach content is developed, and as a base for mobile science education units that will service the Northern Cape Province.

2 PURPOSE

The purpose of this document is to define the user and accommodation requirements for the Carnarvon Science Exploratorium (CSE). The document will also be used to inform the detailed brief for the design and construction of the building. Revisions to the document will be circulated to SARAO as and when changes to the requirements are needed. The full project scope for the site will be designed. The implementation and construction work packages will be reviewed and agreed by SARAO and may be amended, subject to good Project Management methodologies and funding constraints.

.

3 REFERENCES

The following documents are referenced in this document. In the event of conflict between the contents of the referenced documents and this document, this document shall take precedence:

- Feasibility Study for the Establishment of the Carnarvon Visitor Centre
- High-End Concept & Vision for the Carnarvon Visitor Centre
- Business Plan for the Establishment & Operation of the Carnarvon Visitor Centre

4 BACKGROUND

The initiative to establish the Carnarvon Science Exploratorium in Carnarvon (the Centre) began almost 10 years ago. SARAO is responsible for funding the establishment of Centre, and for the first five years of operation, at which point the Centre is projected to be self-funding and the responsibility for the future management and operation of the Centre devolved to the Northern Cape Provincial Government.

A study to determine the feasibility of the project was commissioned and was completed in February 2018. Subsequently, a High-End Concept and Vision for the proposed Centre was commissioned and concluded.

5 ASSUMPTIONS

- Provision has been made for the anticipated number of staff in the office space requirements (to be tested);
- The design brief will ensure that the appointed service provider will adhere to regulations and guidelines around the latest design of buildings with regards to COVID-19;
- Land has been secured for the project by SARAO through a long-term lease arrangement with Kareeberg Municipality
- The building requirements are a first-order estimate (worst-case) and might require space optimisation through design to reduce the overall size of the building. This requirement estimate for the various building functions will be carried through the Conceptual Design Phase together with associated construction cost considerations. These implications (size and cost) will be assessed together with space optimisation in an effort to reduce the building size. Once the CoDR Review Panel has made a final recommendation on the requirements and where these can be optimised, the detailed design will proceed based on either (1) retention of existing requirements or (2) reduction in building overall size requirements.
- An assumption has been made that the building is a single storey building with outside parking.
- The building must comply with the South African National Building Regulations and the Carnarvon Municipality requirements.
- Exterior and interior building finishes will be agreed upon in discussion with the appointed design team.
- Green Building Star status – the green star status will be agreed upon with the appointed design team once trade-off costs and benefits are considered during the design process.

6 LOCATION

Carnarvon is situated on the R63 - 140 from Williston and 63km from Loxton, falling under the jurisdiction of the Kareeberg Local Municipality, and more broadly within the Pixley ka Seme District Municipality of the Northern Cape. Within the Kareeberg Municipality, the nearest towns are Vanwyksvlei and Vosburg, as well as the township of Schietfontein.

The site, known as Erf 431, is approximately 4.5 hectares in size. The site is located at the Western entrance to Carnarvon and is bounded by End Street and the town centre to the East, the R63 to the South, large open space with a small housing development to the West and Mark Street to the North.

7 THE HIGH-END VISION & CONCEPT FOR THE VISITOR CENTRE

Vision

Broadly, the vision for the Centre is that of a sustainable magnet visitor & tourist attraction in Carnarvon that will also benefit local and regional communities through enhanced science education and economic opportunities, while promoting the SKA.

The primary requirement for the achievement of the vision, and the sustainability and spread of the economic and social benefits thereof, is that the Centre must attract the optimum potential number of visitors and tourists, as well as members of the community.

To attract the optimum number of visitors and tourists, the Centre must offer an authentic, compelling, educational, and entertaining experience, which will appeal to the broadest potential audience, and importantly, and experience, knowledge and insights that they could not gain elsewhere.

Concept

Given its remote location, to attract the optimum number of learners, educators, community members, visitors and tourists, the Centre must be positioned, branded, and marketed as a must-see attraction such that people feel compelled to travel the significant distance to experience its distinctive offering. For this to be successful, the Centre must leverage off those competitive advantages which combine to make it a unique attraction, namely:

1. Its direct association with the SKA project (and site) which is internationally recognised as the most ambitious scientific project in the world today; and,
2. The remote physical locality (the Karoo generally and the Carnarvon/SKA site specifically) that has also been inhabited for thousands of years by one of the world's oldest civilizations

It is this philosophical as well as tangible connection between the SKA (SPACE) and the unique physical environment, the history, and the people of the Karoo, together with their ancient and profound meaning of the cosmos more generally (PLACE), that provides the potential to promote and market the Carnarvon Centre experience as unique and compelling. Importantly, the concept reverses what some argue is the biggest constraint to the Centre's ability to attract the optimum number of visitors, namely the remoteness of the location, turning this perceived impediment into its primary drawcard and attraction.

The Visitor Experience

The visit to the Centre is conceptualised as that of a journey of exploration: an exploration of space; an exploration of the origins of life and humanity; an exploration of the history and heritage of the Karoo and its people; and the exploration of the remarkable landscape - a place that describes the deep past, makes sense of the present, and imagines the future. Tapping into the rich history and heritage of the area and its people, the Centre will serve as a staging post for the discovery and exploration of Carnarvon beyond the Centre and

the region, including an historical walking tour of Carnarvon; a hiking trail to Skietfontein (which pre-dates Carnarvon) which will terminate in a stargazing experience; guided walking tours of the MeerKAT National Park; as well as guided tours of the SKA site itself.

8 THE CONCEPT FOR THE VISITOR CENTRE SITE AND BUILDING

The Site

A 4.5-hectare site has been allocated for the establishment of the proposed Centre, at a strategic place at the entrance to the town of Carnarvon. The design and layout of the site must include:

- An indigenous botanical garden representing the rich and diverse Karoo flora
- A children's playground area with the playing apparatus could be themed on space exploration
- An outdoor amphitheatre for staging stargazing events and cultural festivals and performances.

The area around Carnarvon, as well as the town itself, has a rich and layered history of human habitation that dates back thousands of years, to the present. Besides the earliest Ixam Bushman people and their descendants, there are many other settler strands to the history of the area including that of the Dutch and English colonial administrations; German missionaries who set up a mission station in the area now known as Skietfontein; as well as Baster and Xhosa communities that grazed their flocks in the area.

The Building

The design of the site and the building must primarily be informed by the imperative to create:

- i. A high value, integrated and seamless visitor experience; and,
- ii. A functional, accessible community facility and resource that will serve and be valued by the people of Carnarvon

The visitor experience of the site and the building should include, amongst other things

- Good directional and interpretive signage
- A parking space for cars and busses
- A reception/ orientation area where visitors can be welcomed
- Spacious and atmospherically lit areas for exhibitions and interactive displays
- A planetarium space/auditorium for immersive multi-media, audio-visual presentations
- A shop/restaurant/tearoom
- Comfort and ablution facilities
- A landscaped indigenous park/garden with interpretive signage describing Karoo flora and fauna

The community activities that the Centre and the surrounding grounds should accommodate include education and training programmes (including a science resource centre), community meetings and gatherings, cultural events, and recreation activities.

Building User Requirements

Note: Requirements will be reviewed and amended subject to Project Management methodologies and funding constraints.

ITEM	REQUIREMENT
SITE	
Signage	Street directional & branding signage
Parking	Tarmac for cars and buses
Security hut	Shelter for 2 persons
Entrance pathways	Paved areas
Outdoor Amphitheatre	Platform/stage area Raked stepped area for seating
Children's playground	Purpose-made space-themed apparatus
Full-size telescope disk	
Landscaping	
Indigenous botanical garden	Flower beds with indigenous trees/ plants interpretive signage foot pathways
Recreation spaces	Picnic tables Braai areas with tapped water
Entrance	
Reception area / Ticket sales	Counter Pamphlet rack
Service Areas	
Admin front office	Storage cabinets Computer/s & printer
Staff kitchen /scullery	Counter stove microwave fridge table chairs
Cleaning equipment & materials storeroom	Steel cabinets & shelves
Locker room	Lockers /cubicles /shelves
IT server/ equipment	Computer server WIFI modem
Visitor Hospitality	
Café/ Gift Shop)	
Outdoor courtyard	
Female toilets	Toilets / basins / blow driers
Male toilets	Toilets / urinals / basins / blow hand driers
Disabled toilet	Toilet / basins / blow hand drier
Learners	
Activity / workshop/ lecture space	desks / chairs / whiteboard / cupboards / shelves
Toilets	
Community	
Multi-purpose space: resource & computer centre – meetings /workshops /performance space	Tables / chairs / cupboards / shelves
(access to learner toilets)	
General Use	
Multi-purpose space: resource & computer centre – meetings /workshops /performance	Removable stage /podium / projection screen / removable chairs / sound system / projector/s
Courtyards	Outdoor tables & chairs/ umbrella's
Access to toilets	
Offices	

Manager	Desk/ chairs/ cupboards / shelves/ computer / wall safe
Secretary	Desk/ chairs/ cupboards / shelves/ computer / printer
Financial Administrator	Desk/ chairs/ cupboards / shelves/ computer / printer
Education /Visitor Manager	Desk/ chairs/ cupboards / shelves/ computer
Stakeholder Manager	Desk/ chairs/ cupboards / shelves/ computer
Office/s for guides	Desk/ chairs/ cupboards / shelves/ computers
Mobile Science Education Unit	
Double garage for two mobile units	TBC
Lockable storage space for teaching apparatus/ materials	
The Exploration of Space Gallery:	
History of space exploration/astronomy (earliest times to the present)	Graphic panels / AV screens / plinths for artefact displays
Knowledge, science, and technology developed through space exploration	Graphic panels / AV screens / plinths for artefact displays
The (hi)story of astronomy in South Africa	Graphic panels / AV screens / plinths for artefact displays
The story of SKA	Graphic panels / AV screens / plinths for artefact displays
The science of astronomy & SKA (interactive displays)	Graphic panels / AV screens / interactive AV apparatus / plinths for artefact displays
Astro-Tourism Route	Graphic panels / AV screens
The !Xam Cosmos / Lloyd & Bleek Archive, etc.	Graphic panels / AV screens
Exploration of Place (Carnarvon & The Karoo) Gallery	
The Karoo: people, archaeology, and paleontology	Graphic panels / AV screens / plinths & cases for artefact displays
Carnarvon: Earliest inhabitants and settlement: !Xam, Dutch/ English / Missionaries, Xhosa, etc	Graphic panels / AV screens / plinths & cases for artefact displays
Models / Artefacts	
Full size telescope	
Model of telescope	
Planetarium	
Projection space with seating	Removable seats
Projection room	Counter / chairs / lockable storage
Office for Planetarium Operator/ Manager	Desk / chairs / lockable storage
Toilets (?)	
Stargazing platform (outdoor amphitheater)	Optical Telescope Lockable shelter for telescope
Hostel Accommodation	
Sleeping areas	
Kitchen	
Dining hall	
Ablution facilities	

Key Design Principles

The conceptualisation, design, and construction of the building, as well as the site more generally, should be informed by the following key principles:

- The Centre site and building must be maximally accessible
- The site and the building should be integrated within the urban fabric of Carnarvon and not be separated from the community by high fencing or walling. Rather, the current character and use of the site as a space where community members traverse when walking from their homes to the centre of town, or to visit family and neighbours, should be retained. Also, within and outside the building, the navigation of the spaces should be designed so as to enable meaningful interaction and engagement between the members of the Carnarvon community and visitors to the Centre.
- The universally accepted design principle of form follows function must underpin the design of the Visitor Centre building. The primary design imperative is to create a building that accommodates, complements and enhances the visitor experience and activities that will take place there.
- The building design must also express an organic and tangible relationship with the environment and landscape in which it is situated. Visitors should “experience” the building in the same way as they experience the exhibitions, displays and presentations within the Centre.
- The design of the building, as well as the layout of the site on which it is located, should be informed and inspired by the character of the Karoo landscape as well as the scale and aesthetic of the architecture and built form of the local buildings and structures, including the iconic corbel domed buildings, as well as the typical Karoo domestic buildings and townscape.
- At the same time, the design should not be overly parochial but should rather reflect the global nature of the SKA project and the international efforts behind its conceptualisation and realisation. While the building should affirm and celebrate the ancient and present cultural and natural heritage associated with its locality, it should also be forward-looking and present and embody a vision for the future; an inspirational building that reflects the science and vision behind the SKA project and that fosters a culture of collaboration and communication.
- The design of the building should be emblematic of the daring, inquisitive human impulse associated with space exploration as well as being reflective of a global mega-science project which is leading the development of cutting-edge engineering, technology, science and innovation in an effort to realise the MeerKAT and SKA science goals. The building should aim to achieve its own distinctive identity and unique architectural expression that is emblematic of the SKA and the science behind the project.

- The building design must utilise the appropriate green technologies to demonstrate a commitment to renewable energies and environmental sustainability

9. CONTENT & EXHIBITION DEVELOPMENT

The quality of the visitor experience, as provided by the exhibitions, displays and presentations, will be the key success driver for ensuring the popularity and sustainability of the Carnarvon Visitor Centre.

The brief for the conceptualisation, design and construction of the Visitor Centre building is being issued together with the brief for the conceptualisation, research, design, production and installation of the exhibitions and displays so as to ensure that these two critical components are developed and delivered in an integrated and holistic way.

Consistent with the intended visitor experience described above, the following themes, exhibitions and displays are envisaged for the Visitor Centre:

Overarching Theme: The Exploration of Space & Place

The overarching theme of the Visitor Centre experience will be the Exploration of Space & Place, as described above. Included here will be:

1. Space Exploration
 - The history of space exploration/astronomy from earliest times to the present
 - The development of the knowledge, the science, and the technology used to explore space
 - The (hi)story of astronomy in South Africa
 - The story of SKA (from the preparation of the bid to the present)
 - The science of SKA (including the scientific principles of astronomy, radio versus optical telescopes, etc), utilising interactive displays, audio-visual presentations, etc.
2. Place Exploration
 - The (his)story of Carnarvon and surrounds
 - The story of the earliest inhabitants, the !Xam and the !Xam Cosmos, the Xhosa, the early missionaries, the framers, etc.
 - The Karoo: people, archaeology, paleontology, ecology, etc.

Besides the interactive exhibitions and displays, the Visitor Centre will also house a planetarium where fully immersive, audio-visual productions will be presented on subjects ranging from astronomy, science, social and natural history, etc., will be presented.

The visitor offering will also include experiential components, namely:

- Guided tours of the SKA site
- Guided walking tours of the MeerKAT National Park
- A Karoo Botanical Garden with interpretive signage describing the Karoo flora and fauna
- Stargazing to be staged at the outdoor amphitheater
- The Carnarvon History & Heritage Walking Tour
- The Skietfontein Walking Tour