

SKA-Mid Site, Access, Site Management, Host Country Deliverables

SKA_Mid

Tracy Cheetham: SKA_Mid Site Construction Director

12 May 2022

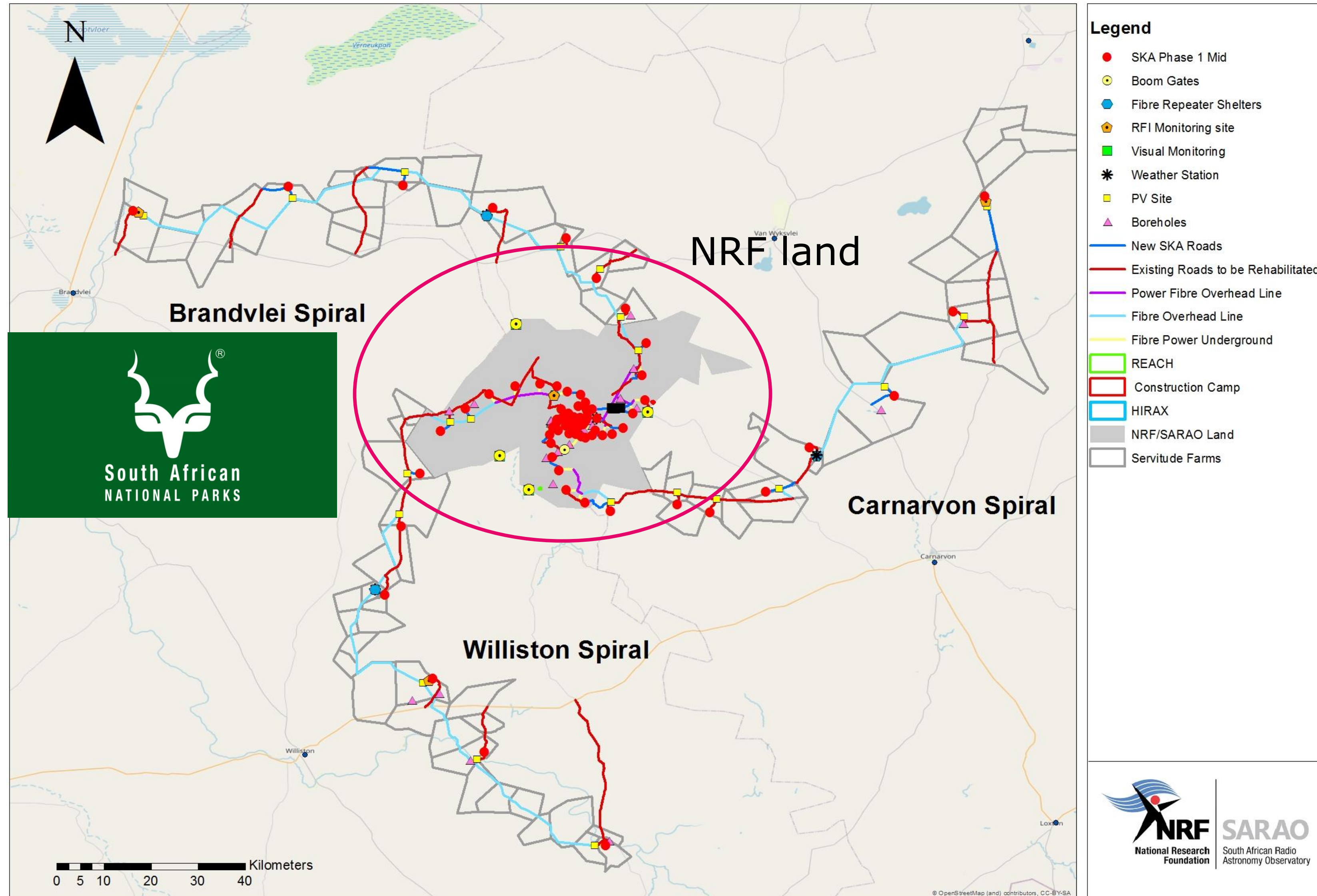


Overview

- Overview of the SKA Site its protection
- Site Access
- Construction Licences
- Health, Safety, Environment
- Site Management
- Site Information & Instructions to Contractors
- MeerKAT/SKA Interferences
- Host Country Deliverables (SKA SOC, EOC, SPC)



SKA Site, Karoo – Northern Cape

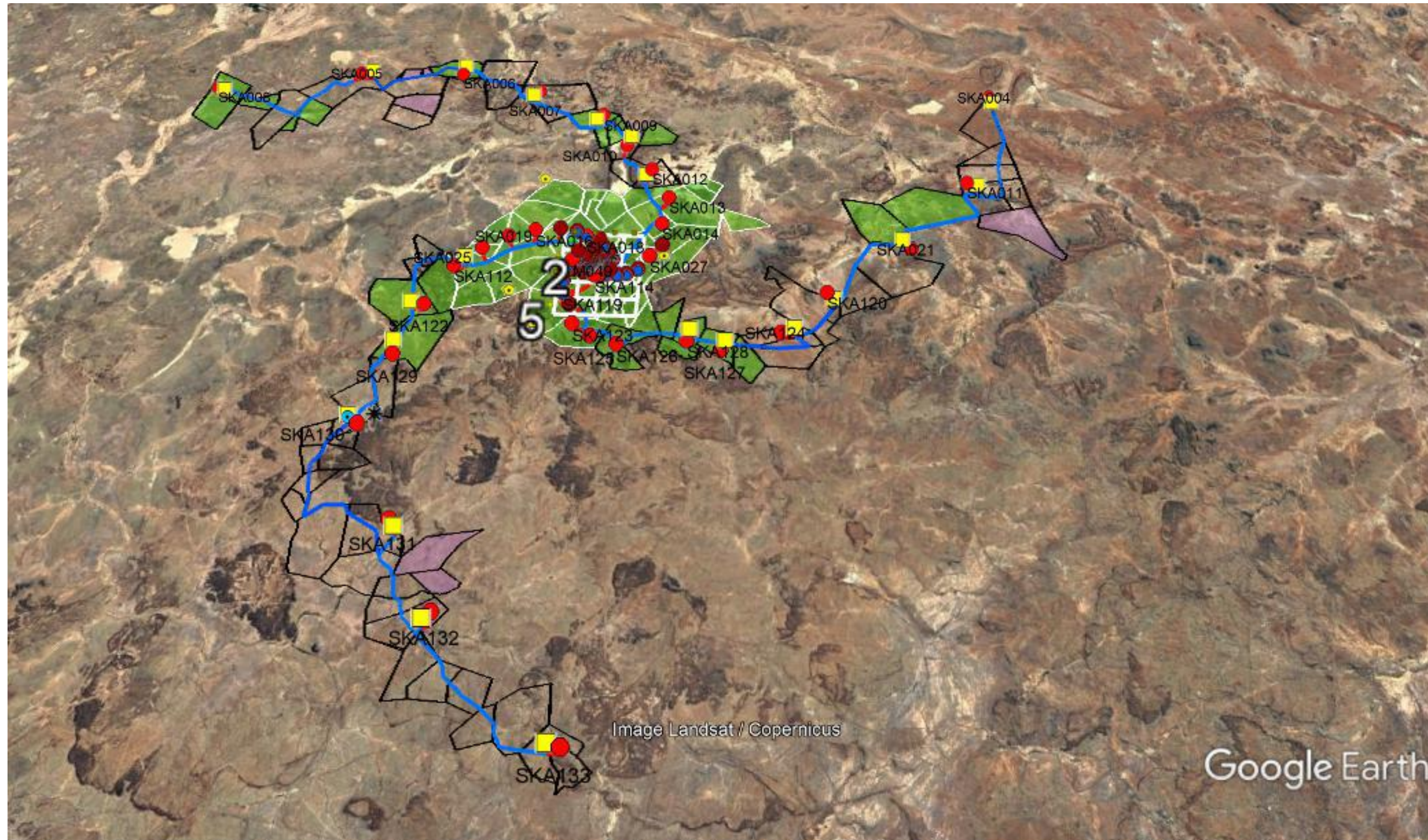


135,000 ha land acquired by NRF – declared Meerkat National Park

3 spiral arms extending to 150km baselines. Being secured through servitude agreement (73 land portions, 54 owners)



SKA Site, Karoo – Northern Cape



26 of the 73 servitudes secured (Host Country)

SARAO schedule indicates full access by Feb 23

Construction to commence in March 23

Early access required for surveys/Geotech



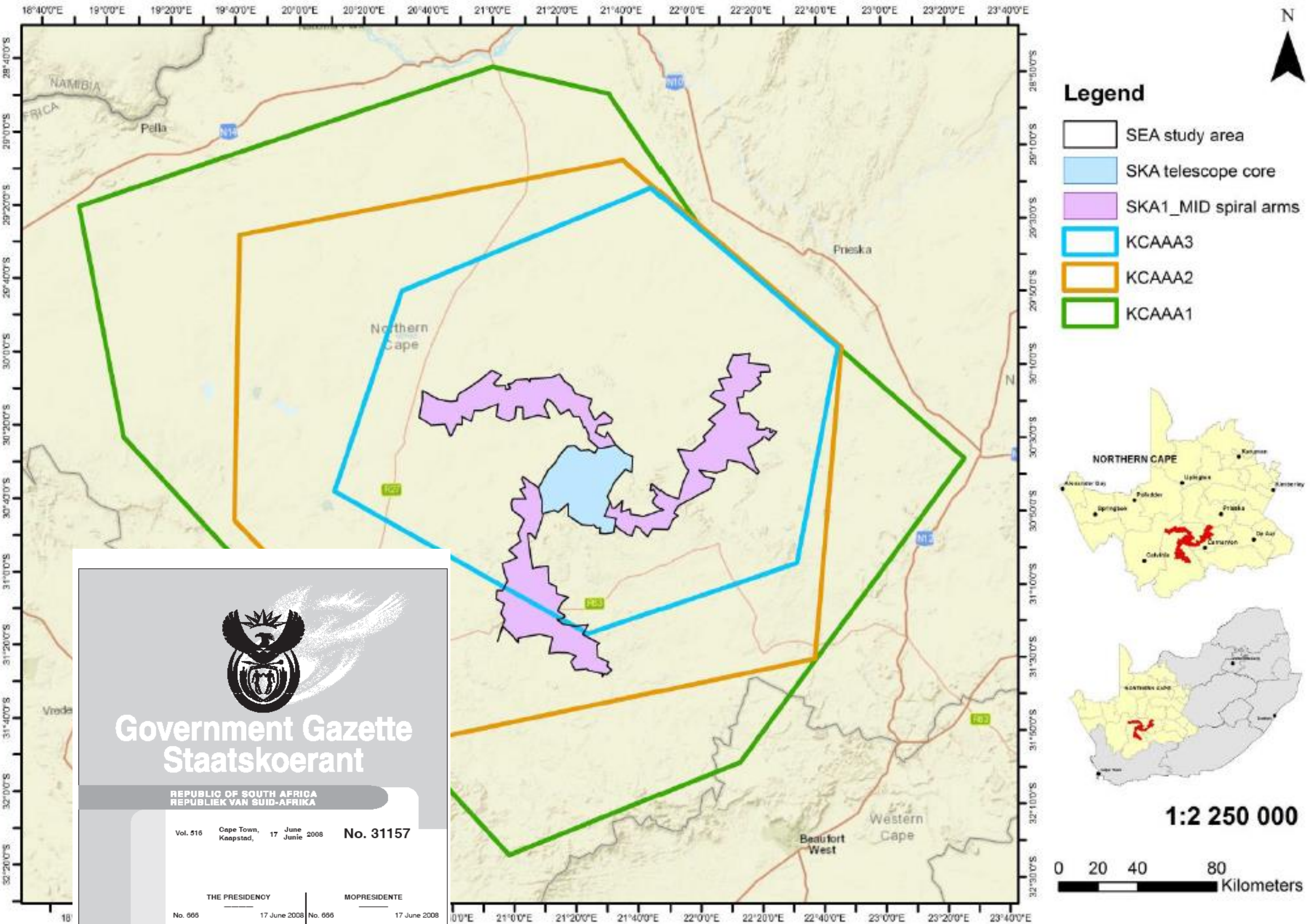
Access to Site: Site Licence Agreement

- The RSA Govt is responsible for making the SKA-Mid site available to SKAO
- The Site Entity (NRF through SARA0) manages and implements most of the South African Government's responsibilities
- Site Licence Agreement:
 - Permission to Access the Site [and construction licences] until MeerKAT is handed over
 - Non-exclusive use of NRF-owned land [exclusive use of servitudes] as MeerKAT / Guest instruments operating on site
 - Draft Site Licence Agreement under review and discussion
- SKAO requirement to enter into a Lease Agreement once MeerKAT handed over to ensure the protection of the SKAO. Exclusivity of occupation & control of access(P&I)



Protection of the Site

Astronomy Geographic Advantage Act, 2007



Minister for Science and Innovation has declared protected areas Three tiers of protected areas:

- Core area – the physical area of the observatory
 - Central area – surrounds the core area. Minister prohibits certain activities / categories of activities in this area
 - Coordination area – Minister sets standards which activities must comply with
- Protected areas apply to existing and new activities

Government Gazette
Staatskoerant

REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID-AFRIKA

Vol. 516 Cape Town, 17 June 2008 No. 31157
Kaapstad, 17 Junie 2008

THE PRESIDENCY
No. 666 17 June 2008

MOPRESIDENTE
No. 666 17 Junie 2008

It is hereby notified that the President has assented to the following Act, which is hereby published for general information.

No. 21 of 2007: Astronomy Geographic Advantage Act, 2007.

Go itsovi fano gore MoPresidente o saennwe Molao o o lateleng o o phasalediwang kitso ya botlhe fano:—

No. 21 of 2007: Molao wa Mafelo a a Siametseng Bolepanaledi wa 2007.

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AIDS HELPLINE: 0800-0123-22 Prevention is the cure



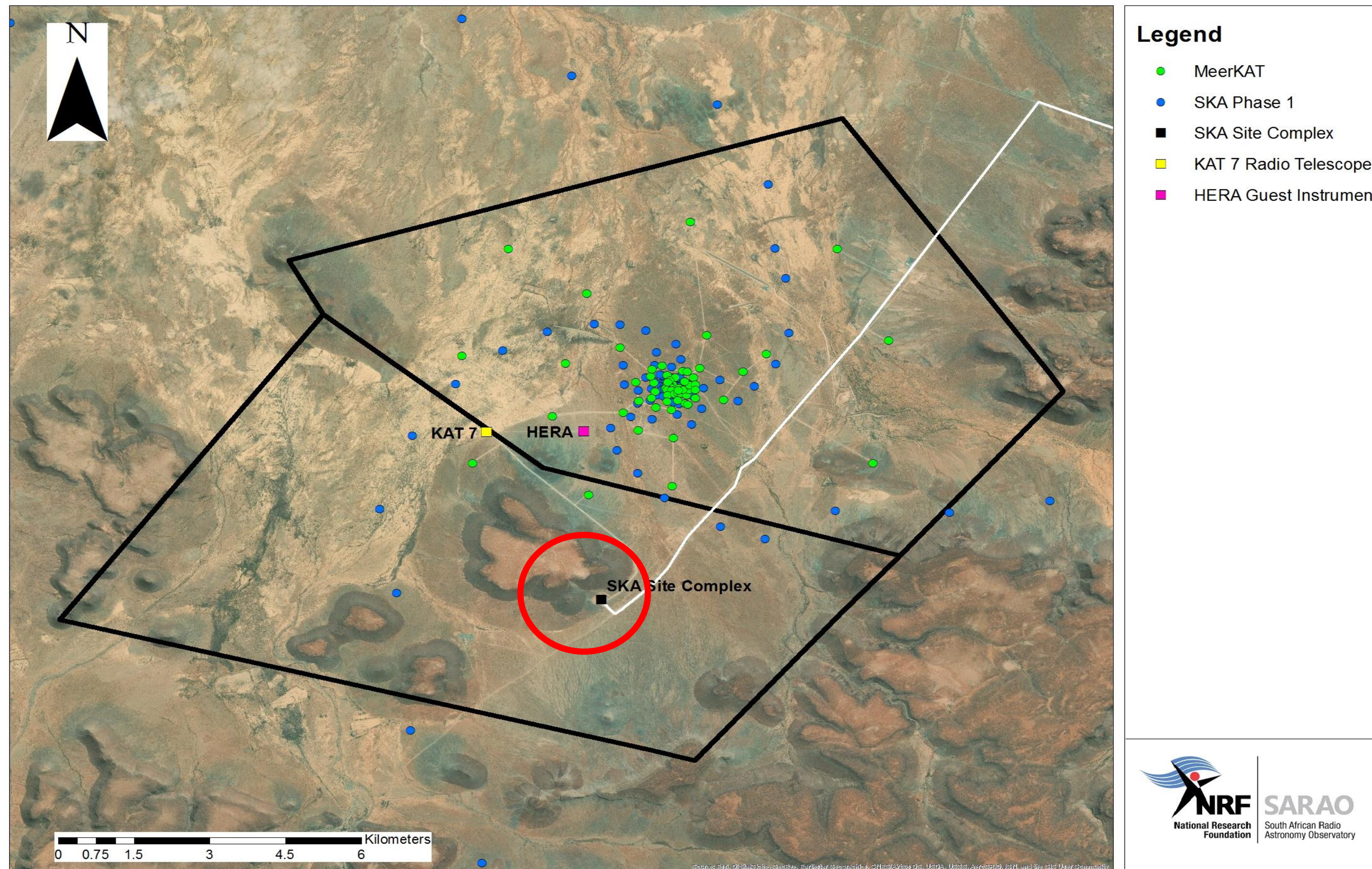
Core Astronomy Area – AGA Act

Meys Dam &
Losberg farms

SKA Site Complex,
KAT 7, MeerKAT
and SKA co-located

Very High Risk RFI
area in terms of the
MeerKAT Science

Declared a Core
Astronomy Area in
terms of the
Astronomy
Geographic
Advantage Act



SKA Site Complex & Laydown Area



SKA Site Complex
(National Key Point)

Includes Dish &
Pedestal Shed;
Karoo Array
Processor Building
& Power Facility

Large laydown area
(7,299m²) for
shipping containers

Additional laydown
areas at old
Losberg and Meys
Dam Contractor
Camps



Construction Licenses

Licenses Obtained

- Exemption from Environmental Authorization obtained – refer to Integrated Environmental Management Plan.
- South African Heritage Resource Authority Heritage Authorization
- Water licenses obtained for water abstraction purposes on NRF land
- Water/waste license for Visserskloof Contractor Camp
- Mineral permit/license exemption
- Development Approval
- Way leaves for proclaimed roads where rehabilitation will take place

Outstanding Licenses (WIP) running concurrently with land servitude programme

- General Authorization: river crossings in spiral arms (SARAO will apply for these)
- Department of Nature Conservation permits for relocation of protected plant species
- Rezoning of base stations/Photovoltaic stations (SARAO)
- Water abstraction in spiral arms (SARAO)
- Department of Labour Construction Permits (these are applied for once Contractors are appointed)



Environmental Management

- A Strategic Environmental Assessment was undertaken for the SKA-Mid site. This culminated in the development of an Integrated Environmental Management Plan
- Detailed heritage, ecology & aquatic walkthroughs have taken place on site
- Minister of Environment, Forestry & Fisheries has granted exemption from obtaining environmental authorization for SKAO activities
- SARAQ, SKAO, SANParks, Contractors & Visitors must comply with Chapter 5 of the IEMP, the Conservation Management Plan & Ecology/Aquatic Management Plan
- Contractors will produce Environmental Management Plans specific to their scope of work which adheres to the IEMP
- Reporting is done annually, internal audits and external audits are conducted as required in the IEMP

Integrated Environmental Management Plan
(IEMP) for SKA Phase 1 mid-frequency array
(SKA1_MID) in South Africa Revision 1



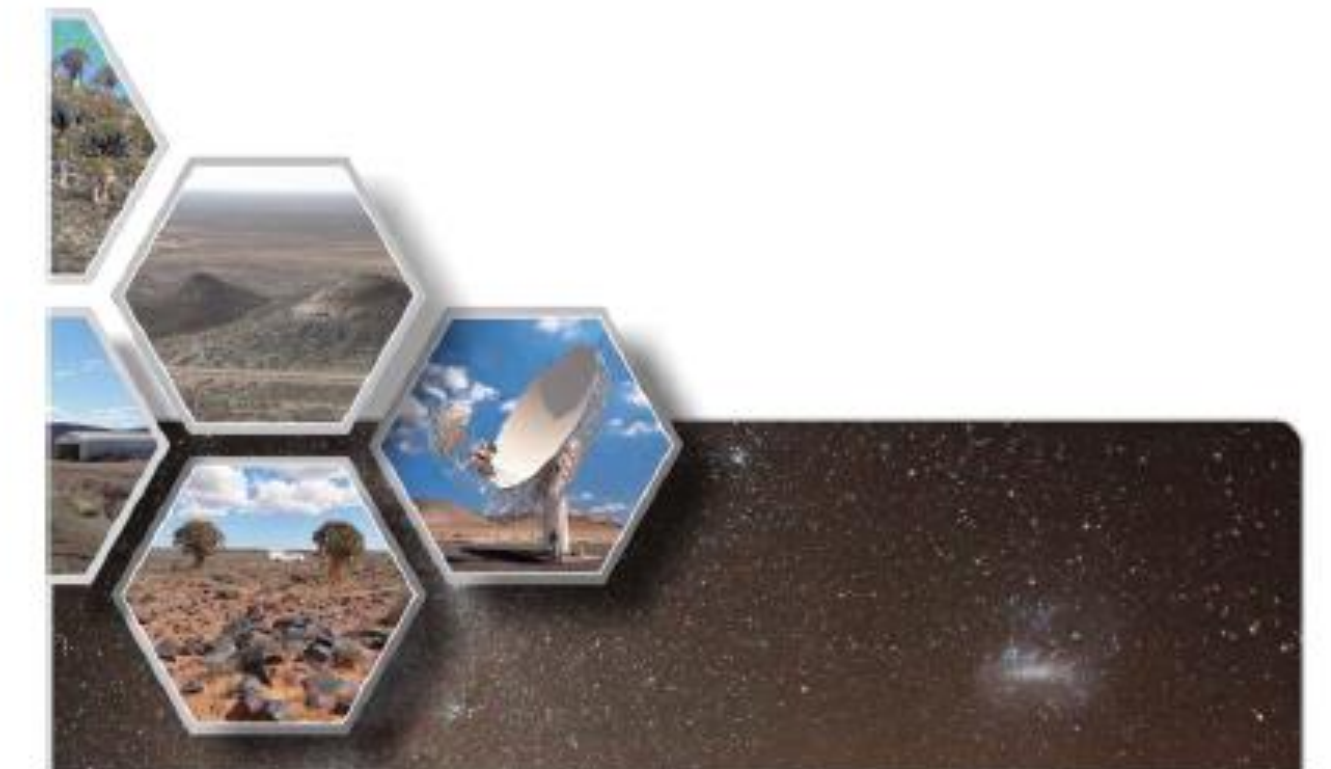
First version published in 2017 and prepared by:
Council for Scientific and Industrial Research (CSIR)

Government Notice 213 in Government Gazette 41498 published for comment by:
Minister Bomo Edna Edith Molewa
Department of Environmental Affairs

Second version updated in 2018 and prepared by:
Gaea Enviro (Pty) Ltd

Government Notice 436 in Government Gazette 42323 Notice for adoption of the Integrated
Environmental Management Plan (IEMP) for the Square Kilometre Array (SKA) (Phase 1) as an
environmental management instrument by:
Minister Nomvula Paula Mokonyane
Department of Environmental Affairs

Draft of Revision 1 of the adopted IEMP prepared by:
The South African Radio Astronomy Observatory (SARAO)



Health & Safety Management

- SKA Observatory Health, Safety & Environmental Policy and the SKAO Health, Safety & Environmental Management
- A South African specific Health, Safety & Environmental Management Plan and site-specific H&S Specification is currently under development which all Contractors shall comply to
- Establishment of an Incident & Accident Reporting System
- Disaster Management Plan and Emergency Response Action Plan in place to respond to emergencies/disasters (jointly coordinated between SARAO and the SKAO)
- HSE Compliance Inspections & Auditing will be undertaken by SKAO HSE Team
- Establishment of the South African HSE Committee



SKA ORGANISATION HEALTH, SAFETY & ENVIRONMENTAL MANAGEMENT PLAN

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 Document Type PLAN
 Revision 03
 Author John Kerr
 Date 2019-10-18
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Name	Designation	Affiliation	Signature
Authorized by:			
Jol			
Jol			
Tim S			
Phil			



South African Health, Safety and Environmental Management Plan
 SKAO-TEL-0000000 Revision 01
 Classification: UNRESTRICTED
 Document type: DTE
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Role	Name	Designation	Affiliation	Signature	Date
Author	Zutari (Pty) Ltd	Consultant	SKAO	_____	
Owner	T. B. Owner	Role/Title of the Owner	SKAO	_____	
Approver	A. P. Prover	Role/Title of the Approver	SKAO	_____	
Released by	T. B. Releaser	Role/Title of the Releaser	SKAO	_____	



RFI Management

- SKA RFI/EMC Standard
- SKA EMI/EMC Management Plan
- SKA System EMI/EMC Control Plan for Procurement and Manufacturing Phases
- Applying Site Protection Levels to Measurement Data
- SARAQ RFI Policy
- SARAQ RFI Controls Policy
- SARAQ Radio Frequency Interference Karoo Site Procedures

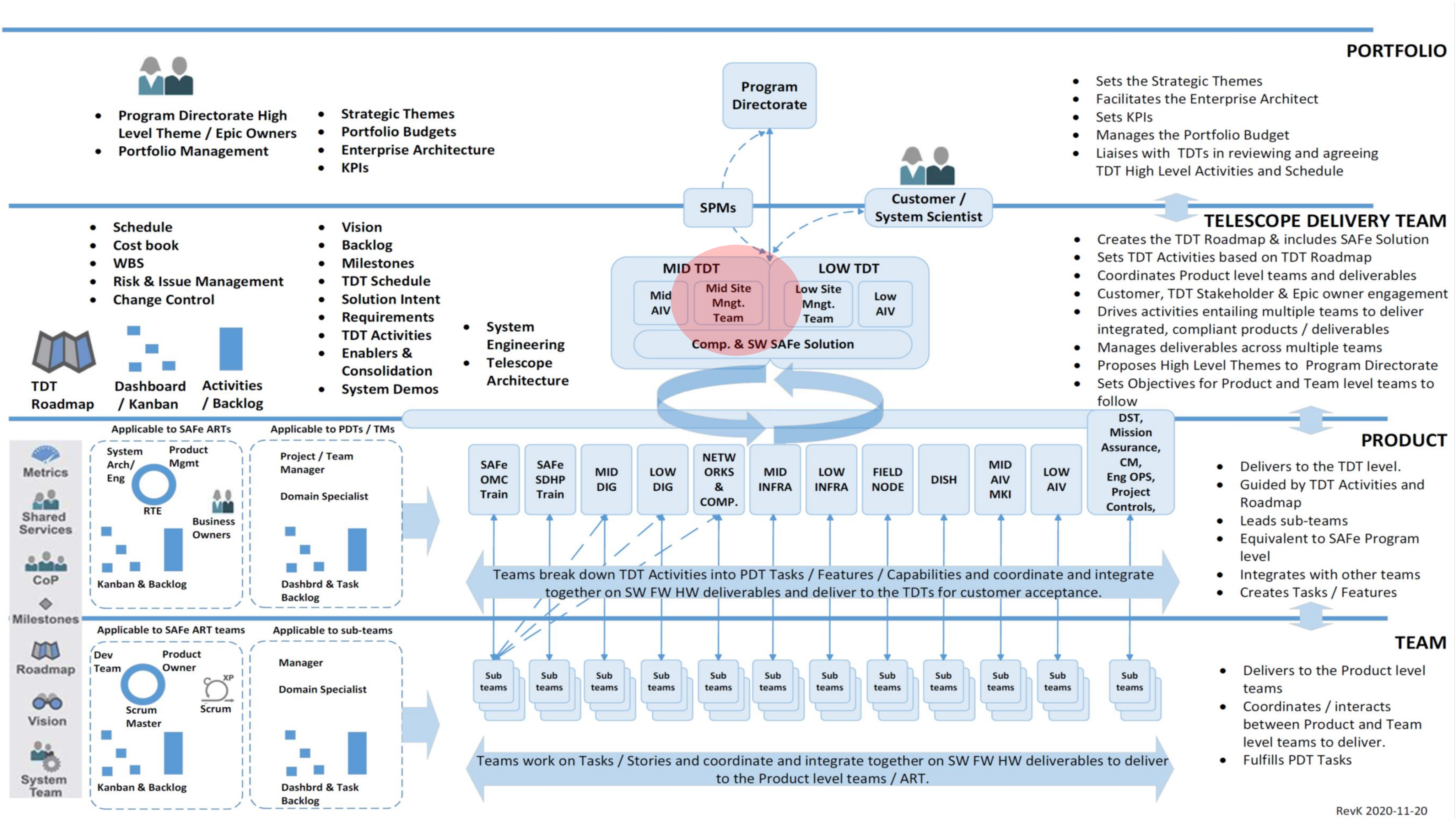
Braam's presentation



Site Management Team



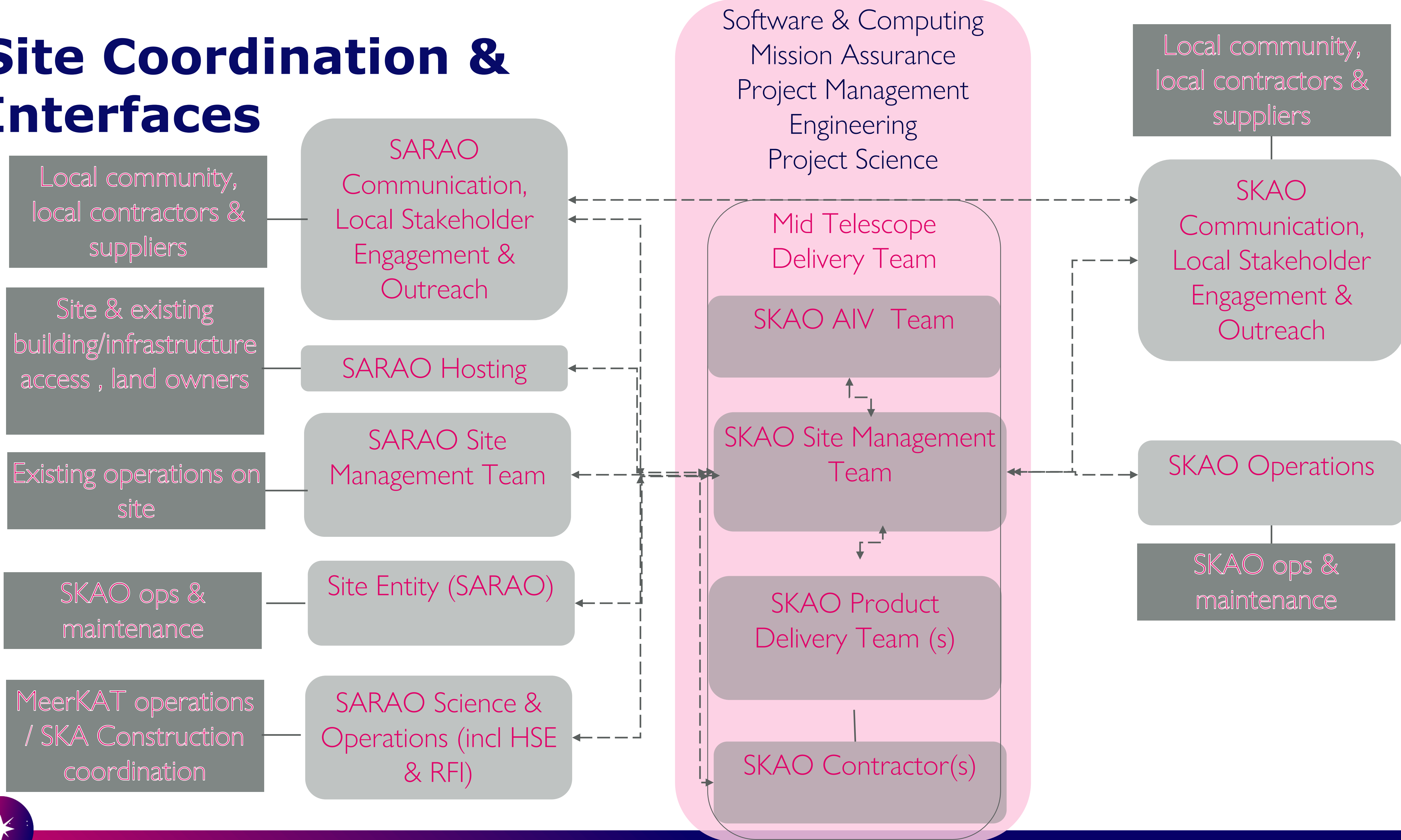
Site Management Team / PDT / TDT



RevK 2020-11-20



Site Coordination & Interfaces



Site Management Team Roles & Responsibilities

- Ensure coordination between all the role-players on Site
- Support the realization of the project construction schedule, coordinate the use of resources and provide necessary decision making on priorities under dynamic situations on Site;
- Coordinate with SRAO Operations in terms of scheduling/changes between MeerKAT science and operations (which includes maintenance of existing infrastructure) and the construction of SKA_Mid to avoid interferences as far as possible
- Ensure compliance with the Site Information Document & Instructions to Contractors which includes, Health, Safety, the Environment and RFI Management
- Coordinate and lead the 'Plan of the Day' meetings with all contractors and supervisors on site. This meeting will be led by the SKAO Site Manager. The Site Construction Director will lead the "3 monthly Look-ahead" meetings to identify risks, challenges, changes or interferences and proposed mitigation
- The SMT will support the SKAO Senior Project Manager: MID, SKAO PMs and SKAO Supervisors to ensure effective implementation between the Contractors and provide real-time feedback regarding schedules, activities and issues that may arise



Local Engagement & Participation

- “Localized Primary Zone” are the town of Carnarvon, Williston, VanWyksvlei, Brandvlei and “Localized Secondary Zone” is the Northern Cape Province
- Local community engagement & participation must be carefully managed
- SKAO Site Management Team will provide a Contractor induction on how to engage local authorities, local contractors, local community and suppliers. This will be supported by the SKAO & SARAO communication/outreach team
- Local employment opportunities critical in creating a social value proposition
- Z clauses introduced for INFRA contracts (local participation plans and performance measures). Other contracts work in progress [Dish, IPPs]



Site Information Document & Instructions to Contractors

- Part A covers the location of the site in South Africa, main access routes to the site and transportation routes from major urban centres, airports and ports in South Africa
- Part A also covers the environmental conditions that can be expected for people visiting or working at the site which includes detailed weather data, geotechnical, geohydrological, environmental, topographical and heritage information
- Part B covers the obligations, requirements, policies and procedures that must be understood and complied with when travelling to or visiting site or being involved in construction or operational activities at the site



South African Site Information & Instructions : SKA_MID: Part A – Site Information

SKA-TEL-SKO-0001040 Revision 02
Classification: UNRESTRICTED
Document type: MPL
Date: 2021-09-25
Status: RELEASED



South African Site Information & Instructions : SKA1 MID: Part B – Site Instructions

SKA-TEL-SKO-0001040 Revision 02
Classification: UNRESTRICTED
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Date: 2021-09-15
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Role	Name	Designation	Affiliation	Signature	Date
Author	T. Cheetham	Construction Director	SKAO		2021-09-20
Owner	J. McMullin	Programme Director	SKAO		Oct 6, 2021
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Released by	J. McMullin	Programme Director	SKAO		2021-10-06

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Site Information Document & Instructions to Contractors (Part B)

- Site Checklist
- Site Access and procedures to access land on spiral arms
- Procedures for Access to existing facilities, services and protection
- Site Inductions
- Compliance to RFI standards, policies & procedures
- Health, Safety, Environment compliance requirements including Disaster Management & Emergency Response
- Compliance to the Construction Licences
- SARAQ Policies & Procedures for Site
- Communication devices on Site
- Contractor Camp requirements
- Laydown areas, stockpiling, batching plants, equipment cleaning areas
- Transport Management
- Security



MeerKAT Science / SKA Construction Interferences Management

MeerKAT Science/SKA-Mid Construction Interferences Management Plan & Risk Register identifies:

Risks, impact, duration, geographic location and proposed mitigation during concurrent construction of SKA-Mid and the operation of MeerKAT/guest instruments in relation to the following Victims and Culprits

SKA-Mid will require 60 hours/week of daytime work and that certain night-time activities (dish photogrammetry, commissioning etc.) will be conducted on the dishes



MEERKAT SCIENCE/SKA1 CONSTRUCTION INTERFERENCES MANAGEMENT PLAN

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 Revision 01
 Author Tracy Cheetham
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Name	Designation	Affiliation	Signature
Authored by:			
T. Cheetham	Head: Construction Planning	SKAO/SARAO	
Reviewed by:			
J. Jonas	Chief Technologist	SARAO	
F. Camilo	Chief Scientist	SARAO	
L. Magnus	Head: Operations	SARAO	
T. Kusel	SKA Programme Manager	SARAO	
T. Abbott	MeerKAT Programme Manager	SARAO	



MeerKAT Science / SKA Construction Interferences Management

- Key Risks include:
 - Power outages required within the Observatory to undertake switchovers from MeerKAT to the SKA power network causing downtime for MeerKAT observing
 - Installation of the SKA masers in the Maser Room could lead to Electro Static Discharge (ESD) problems and temperature variations or vibrations which will affect the accuracy and precision of the MeerKAT timescale
 - EMC/EMI generated from:
 - the Contractor Camp,
 - the internal Communication Network and
 - electronic equipment and vehicles which causes interference



MeerKAT Science / SKA Construction Interferences Management

- Key Risks include:
 - Damage to existing infrastructure and/or RFI shielding within the CPF, Power Facility, diesel fuel supply system and the existing electrical and fibre infrastructure installed on site
 - Two decision-makers on SKA site during MeerKAT operations and SKA1 construction which could cause confusion and potential delays for both MeerKAT and the SKA
 - Restrictions placed on SKA-Mid construction during the day because MeerKAT science observations are taking place during the day which will impact on costs and the construction schedule



MeerKAT Science / SKA Construction Interferences Management

- Key Mitigation include:
 - Power Ramp Up / Commissioning Plan developed to minimize disruptions / outages on site (INFRA 1)
 - Access and work procedures defined in Site Information Document & Instructions to Contractors [Applicable Document for all construction contracts] for work being undertaken in the KAPB/Power Facility/Maser Room; work being undertaken on site
 - Contractor Camp was relocated further away from Site and restrictions defined in Site Information Document & Instructions to Contractors
 - Design change from Mid-frequency communication network to a low-frequency communication network to address interference. EMC Control Plan developed as part of mitigation
 - RFI Controls and Enforcement on site [Management Plans, SID, EMC Control Plans, RFI Permits and Certificates of Compliance)

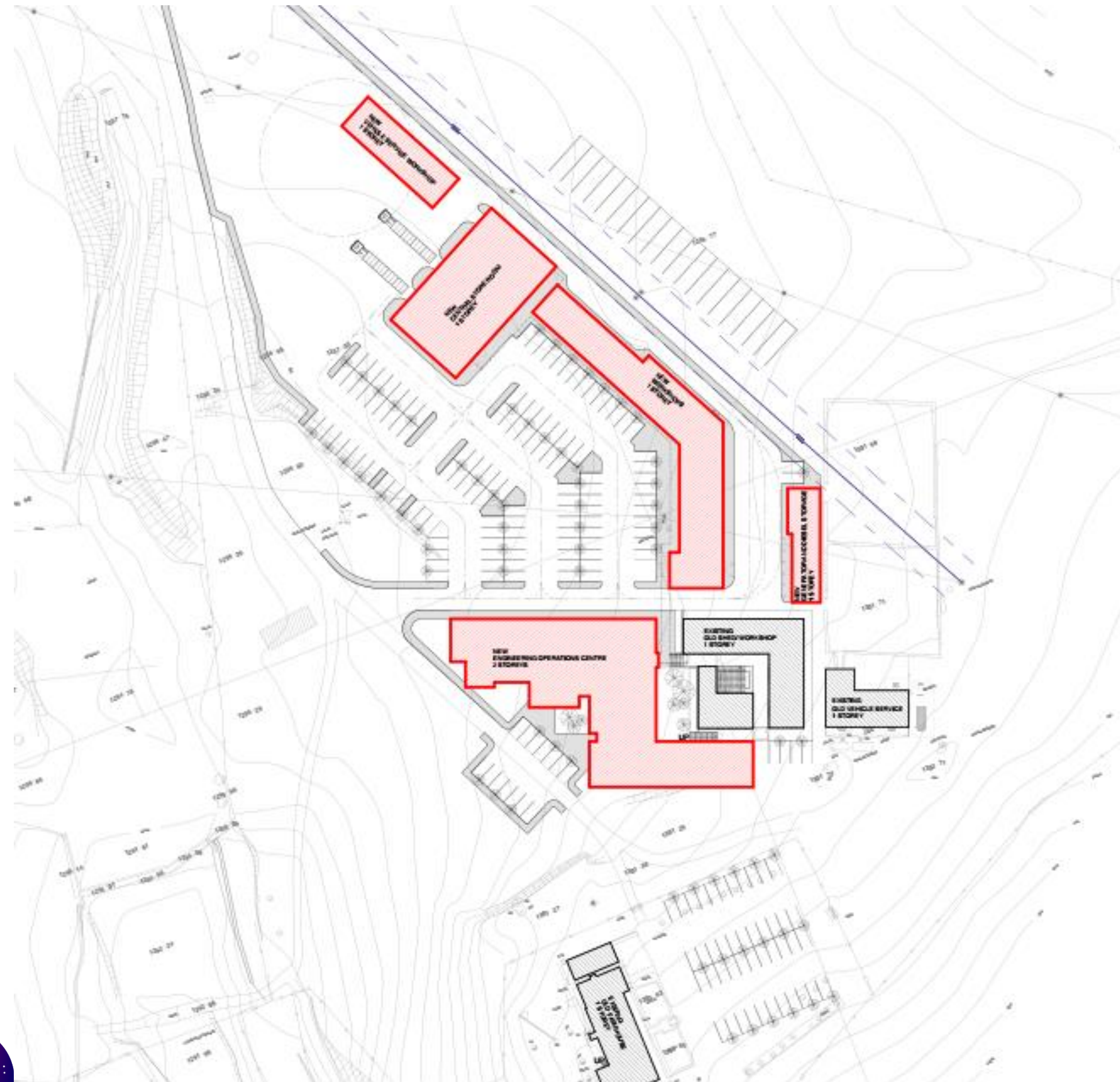


MeerKAT Science / SKA Construction Interferences Management

- Key Mitigation include:
 - Roles & Responsibilities between SARA0 and the SKAO being defined in Site Management Plan and the Project Execution Plan
 - Weekly, monthly and quarterly look ahead meetings during SKA-Mid construction to address programmatic conflicts between MeerKAT operations and SKA-Mid construction
 - MeerKAT+ lessons learnt incorporated into various documents (SID, tender docs)
 - Opportunity to design and execute a set of scheduling blocks using MeerKAT which would be representative observing cases to explore RFI situations



Host Country Deliverables – Engineering Operations Centre, Klerefontein



- The Engineering Operations Centre (EOC) will be located at Klerefontein which is 10km from the town of Carnarvon and 85km from the Site
- The EOC will be the operational support base for the on-site activities and includes:
 - Offices & meeting rooms for the Construction Support and Operations teams (\pm 70 SKAO staff) & Site Entity staff
 - Mechanical, electrical and instrumentation workshops
 - Server Room, Stores
 - RFI reverberation and equipment chamber

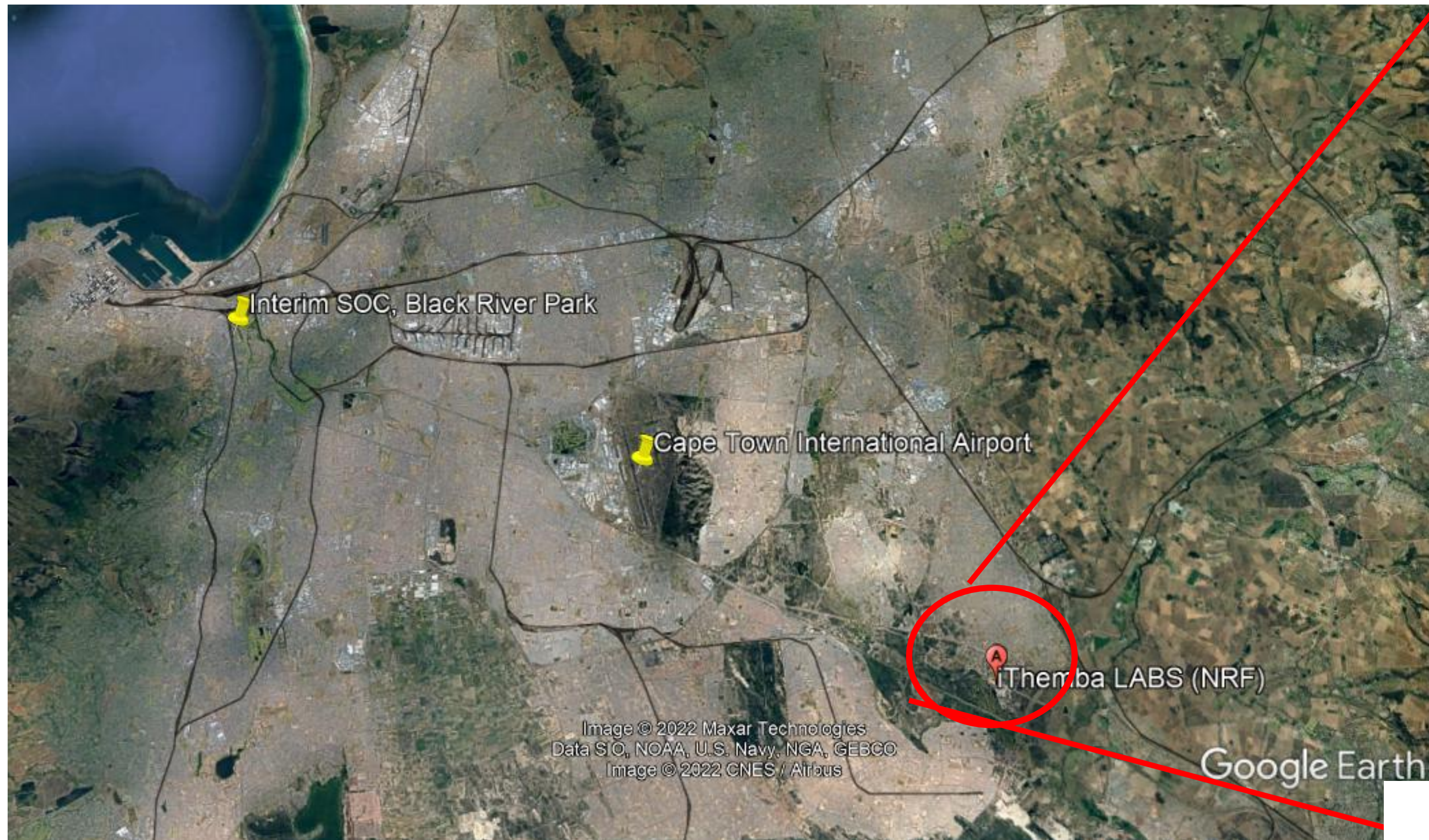


Host Country Deliverables – Engineering Operations Centre, Klerefontein

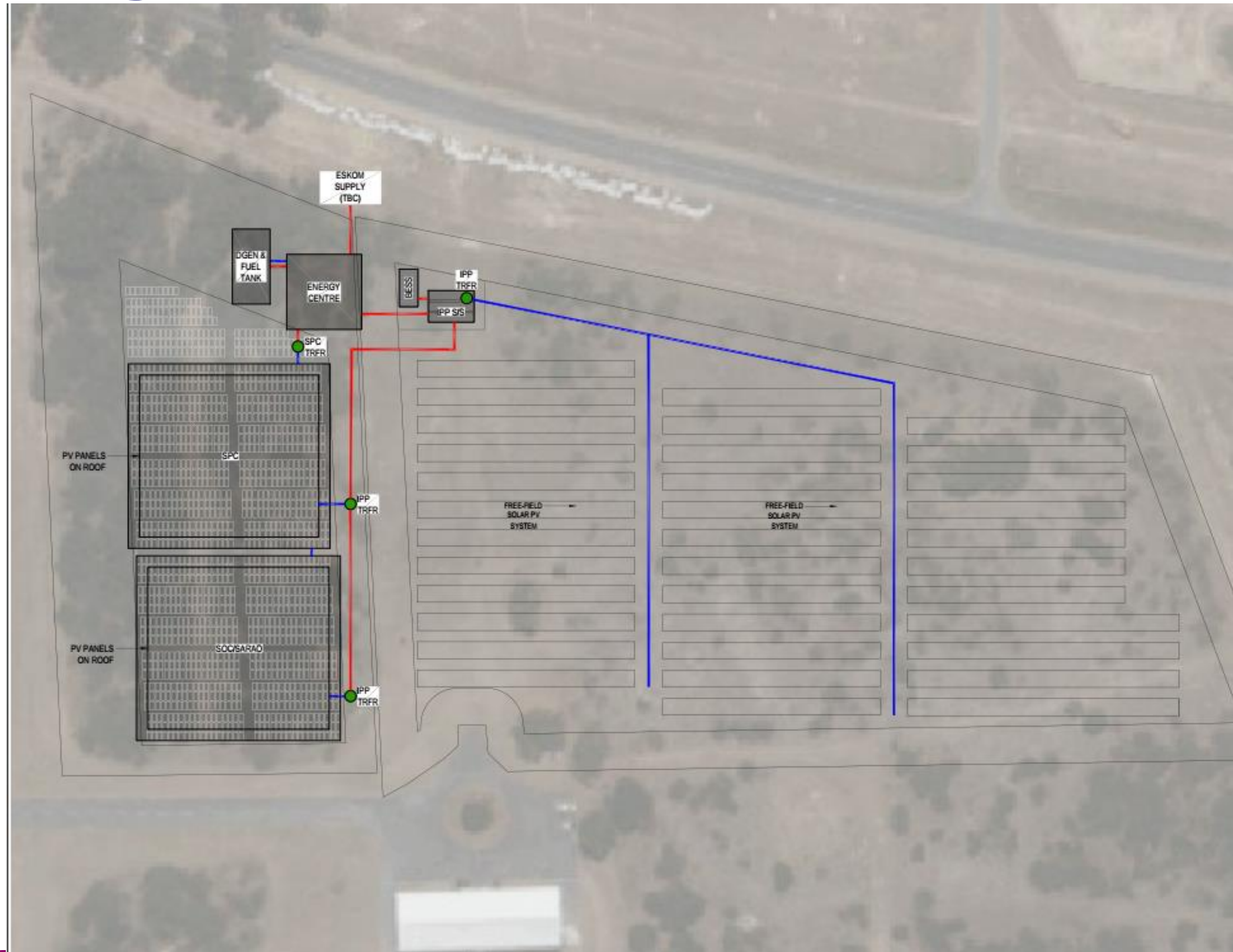


- Concept Design underway
- SARAO will issue a design/construct tender later in Q3 of 2022
- Expected completion in 2024
- Temporary EOC (portacabins) to be delivered by SARAO in Q2 of 2022 to provide offices to SKAO staff
- Temporary EOC to be located adjacent to existing SARAO facilities at Klerefontein

Host Country Deliverables – Science Operations Centre, Science Processing Centre, Science Regional Centre



Host Country Deliverables – Science Operations Centre, Science Processing Centre, Science Regional Centre



- Co-location Agreement between Ithemba LABS and SARA0 (both NRF National Facilities) is close to signing to host SKAO (SPC, SOC) & SARA0 (+SRC) facilities
- Master Development Plan for the site underway
- Power Concept Design completed (refer to Adriaan's presentation)
- SARA0 working through funding model for delivery
- Expected completion in 2025
- Modular deployment approach for SPC being considered to potentially reduce timelines (SPC deployment to be prioritised)



Host Country Deliverables – Science Processing Centre (+Science Regional Centre)

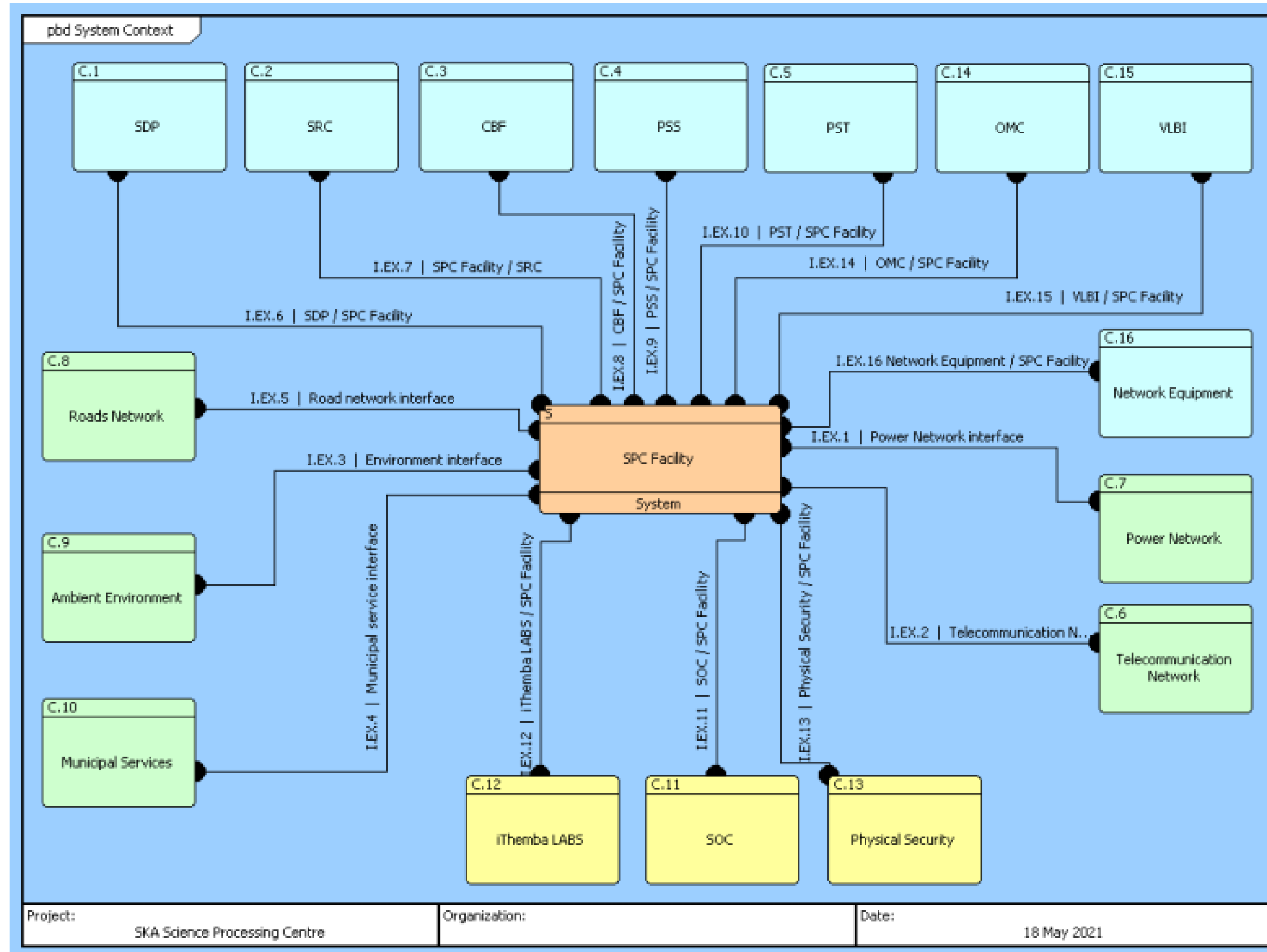


Figure 1 - System physical context diagram

- CoDR held in May 2021
- Trade-off studies undertaken for Cooling and Power
- Cooling recommendation:
 - Total Cost of Ownership – 30% Air and 70% liquid heat rejection cooling optimal solution
- Power trade-off study recommendations informed power concept design for iThemba LABS site Internal and External Interfaces defined
- Next steps: preliminary and detailed design



Interim Science Operations Centre, Cape Town



- Interim SOC & sITF located in Black River Park, Observatory
- Same Office Park as SARA0
- 5 year Lease Agreement signing underway
- Space to accommodate 80 staff
- Internal fit out will commence once Lease Agreement is signed
- Anticipated occupation: July/Aug 22



Thank you

*We recognise and acknowledge the
Indigenous peoples and cultures that have
traditionally lived on the lands on which
our facilities are located.*

SKAO

www.skao.int