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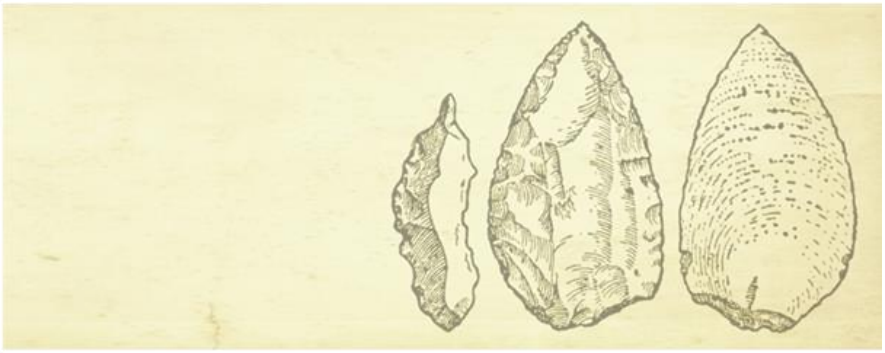

PHASE 1 AIA HERITAGE DESKTOP STUDY SKA MEERKAT NORTHERN CAPE

PROPOSED EXPANSION OF THE SQUARE KILOMETRE ARRAY (SKA) MEERKAT PROJECT ON THE FARMS MEY'S DAM RE/68, BRAK PUTS RE/66, SWARTFONTEIN RE/496 & SWARTFONTEIN 2/496, IN THE KAREEBERG LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, AND THE FARMS LOS BERG 1/73 & GROOT PAARDEKLOOF RE/74, IN THE KAROO HOOGLAND LOCAL MUNICIPALITY, NAMAKWA DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.

PREPARED FOR:
CONCOR CONSTRUCTION

PREPARED BY:
HEIDI FIVAZ & ANZEL VELDMAN
& JAN ENGELBRECHT
UBIQUE HERITAGE CONSULTANTS

14 JUNE 2021

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Research Assistant
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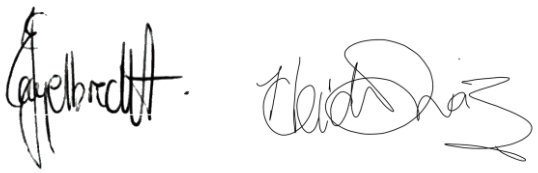
Declaration of independence:

We, Jan Engelbrecht and Heidi Fivaz, partners of UBIQUE Heritage Consultants, hereby confirm our independence as heritage specialists and declare that:

- we are suitably qualified and accredited to act as independent specialists in this application;
- we do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.



Signed:
J.A.C. Engelbrecht, H. Fivaz &
UBIQUE Heritage Consultants

Date: 2020-06-14

SUMMARY OF SPECIALIST EXPERTISE

JAN ENGELBRECHT
CRM ARCHAEOLOGIST

Jan Engelbrecht is accredited by the Cultural Resources Management section of the Association of Southern African Professional Archaeologists (ASAPA) to undertake Phase1 AIAs and HIAs in South Africa. He is also a member of the Association for Professional Archaeologists (ASAPA). Mr Engelbrecht holds an honours degree in archaeology (specialising in the history of early farmers in southern Africa (Iron Age) and Colonial period) from the University of South Africa. He has 12 years of experience in heritage management. He has worked on projects as diverse as the Zulti South HIA project of Richards Bay Minerals, research on the David Bruce heritage site at Ubombo in Kwa-Zulu Natal, and various archaeological excavations and historical projects. He has worked with many rural communities to establish integrated heritage and land use plans and speaks Zulu fluently. Mr Engelbrecht established Ubique Heritage Consultants in 2012. The company moved from KZN to the Northern Cape and is currently based at Askham in the Northern Cape within the Mier local municipality in the Kgalagadi region. He had a significant military career as an officer, whereafter he qualified as an Animal Health Technician at Technikon RSA and UNISA. He is currently studying for his MA Degree in Archaeology.

HEIDI FIVAZ
ARCHAEOLOGIST &
OBJECT CONSERVATOR

Heidi Fivaz has been a part of UBIQUE Heritage Consultants since 2016 and took over ownership in 2018. She is responsible for project management, surveys, research and report compilation. She holds a B.Tech. Fine Arts degree (2000) from Tshwane University of Technology, a BA Culture and Arts Historical Studies degree (2012) from UNISA and received her BA (Hons) Archaeology in 2015 (UNISA). She has received extensive training in object conservation from the South African Institute of Object Conservation and specialises in glass and ceramics conservation. She is also a skilled artefact and archaeological illustrator. Ms Fivaz was awarded her MA in Archaeology (cum laude) in 2021 by the University of South Africa (UNISA), focusing on historical and industrial archaeology. She is a professional member of the Association of South African Archaeologists and has worked on numerous archaeological excavation and surveying projects over the past ten years.

ANZEL VELDMAN
ARCHAEOLOGIST

Anzel Veldman has recently become informally part of UBIQUE Heritage Consultants. She is responsible for research and desktop studies. Mrs Veldman obtained her BA in Archaeology (UNISA 2007), her BA Honours Archaeology (UNISA 2009) and MA degree in Anthropology (University of Johannesburg 2014). The research focus of her MA degree was excavating a Late Stone Age stone circle and rock shelter site in Namibia. As former curator of Owela Display Museum in Namibia (National Museum of Namibia, Ministry of Youth, National Service, Sport and Culture), she conducted archaeological site surveying and excavation. She was also part of the Annual CORUS student training partnership (National Museum of Natural History, France and National Museum of Namibia). Her research focus since 2007 has been on the introduction of livestock into southern Africa during the Later Stone Age. Mrs Veldman has been part of various projects, including ethnographical and archaeological research and artefact analysis (lithics, ostrich eggshell, copper, and pottery) from Later Stone Age contexts. She has a sound knowledge of the Stone and Iron Ages from southern Africa and has published several journal articles on the topic.

EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by CONCOR Construction as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) to conduct a cultural heritage desktop assessment to determine the impact of the Square Kilometre Array/Karoo Array Telescope (SKA MeerKAT) extension on the Farms Mey's Dam Re/68, Brak Puts RE/66, Swartfontein RE/496 & Swartfontein 2/496, in the Kareeberg Local Municipality, Pixley Ka Seme District Municipality, and the Farms Los Berg 1/73 & Groot Paardekloof RE/74, in the Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province on any possible sites, features, or objects of cultural heritage significance.

The project includes 133 satellite dishes (112 in the core and 21 in the spiral arms), upgrades and construction of access roads, overhead and underground power cables, substations and electrical kiosks, five photovoltaic plants, 20 borrow pits, three stone quarries, three construction camps and upgrades to the Klerefontein construction camp. The lifespan of the project is expected to last 50 years. The SKA core area consists of 36 farms which are intended to be proclaimed a Protected Area in terms of the National Environmental Management: Protected Areas Act, Act 57 of 2003 (NEMPA). The HMP will inform the management measures to be incorporated into the Park Management Plan to be developed by South African National Parks (SAN Parks) for the Protected Area.

Findings of Heritage Desktop Study

Digby Wells Environmental (Pty) Ltd was appointed by the South African Radio Astronomy Observatory (SARAO) to undertake a Heritage Impact Assessment (HIA) and Heritage Management Plan (HMP) as a result of the Strategic Environmental Assessment (SEA) Process for the proposed Square Kilometre Array (SKA) project in the Northern Cape Province in terms of section 38(1) of the National Heritage Resources Act, Act 25 of 1999 (NHRA). Their study assessment included desktop research and extensive field surveys, mitigation recommendations, and conservation plans. SAHRA issued comments on 07/09/2018 endorsing the project and provided several conditions. Further comments were delivered on 01/10/2020. (See SAHRIS CaseID 12292 and CaseID 10314 for reference and the complete reports).

A total of 145 heritage resources were recorded through the SEA and HIA process. These include Stone age and rock art sites, graves, historic build environments and farmscapes, as well as intangible cultural heritage sites. The cultural significance rate from low to high for these identified resources. (See Section 6 p19 for detailed lists). Thirty of these heritage resources were recorded on farms associated with the SKA MeerKAT extension phase.

Recommendations

The HIA Desktop Report supports the findings and the recommendations made in the initial HIA reports submitted to SAHRIS CaseID 12292. Expressly, the Conservation Management Plans with

Chance Finds Protocols compiled by Digby Wells Environmental (Hardwick et al. 2018, 2020) and accepted by SAHRA for the whole study area affected by the South African Radio Astronomy Observatory Square Kilometre Array Project.

For reference, see:

Hardwick, S, Van der Walt, J., du Piesanie, J. 2018a. The South African Radio Astronomy Observatory Square Kilometre Array Project: Heritage Impact Assessment. Digby Wells Environmental: Unpublished Report.

Hardwick, S, Du Piesanie, J, Van der Walt, J, Bamford, M, & Otto, D. 2018b. The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project: Chance Finds Protocol, Digby Wells Environmental: Unpublished Report.

Hardwick, S, Du Piesanie, J, Van der Walt, J, Bamford, M, & Otto, D. 2018c. The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project: Chance Finds Protocol, Digby Wells Environmental: Unpublished Report.

Hardwick, S, Van der Walt, J., du Piesanie, J. 2020a. The South African Radio Astronomy Observatory Square Kilometre Array Project: National Heritage Resources Act, 1999 (Act No. 25 of 1999) Section 35 Mitigations - Archaeological Mitigations Report, Digby Wells Environmental: Unpublished Report.

Hardwick, S, House, A, Du Piesanie, J, & Bamford, M. 2020b. The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project Heritage Impact Assessment Addendum, Digby Wells Environmental: Unpublished Report.

The following conclusions and general remarks apply:

According to Hardwick et al. (2018a):

1. A project-specific CMP including CFPs must be developed and implemented as part of this project that considers the project-specific activities concerning the itemised infrastructures. In addition, the CMP and CFPs must consider the sensitivity of the landscape in terms of palaeontology and archaeology.

2. Built Heritage resources with a recommended field rating of Grade II be formally declared or Grade III included in the national inventory. Recommended buffers around the structures intended for retention include a 1 km buffer for Grade II, retained Grade III A resources will require a 150 m buffer zone and retained Grade III B and III C resources require a 50 m buffer. These buffer zones must be implemented during the construction phase and operation phases.

3. Structures older than 60 years are afforded general protection and subject to permitting requirements stipulated under Sections 27 & 34 of the NHRA and regulated by Chapter IV of GN R 548. Individual permit applications must therefore be submitted for each protected building proposed for demolition. In addition, the affected structures must be recorded in detail, including photographs and measured drawing, before their alteration or destruction.

4. The development footprint must be rehabilitated as far as possible to reduce the intensity of the visual disturbance. This may include the following activities:
   - Limiting heights of any topsoil spoils that may be created
   - Trenched areas must be re-contoured

- Borrow pits and quarries must be profiled to a natural topography
- Disturbed areas must be revegetated with indigenous species following the requirements contained within the Ecological Assessment.
- Dust suppression techniques should be employed as far as possible to limit dust pollution during construction activities.
- Construction during the night must be avoided as far as possible. Where unavoidable, areas where these activities are taking place should be lit, and the number of lights and brightness must not exceed the minimum requirements for safety and security.
- Downlighting and low-pressure lighting mediums such as sodium light sources must be implemented to minimise light pollution. In addition, lights should be directed towards the Project area and not outwards from the Project area.

According to Hardwick et al. (2020b; 2020a):

1. It is recommended that a buffer of 50 m be established around known Stone Age occurrences with a low cultural significance and General Protection IV A rating. These sites were mapped and recorded. The identified heritage resources should be maintained in situ as far as is feasible.

2. Digby Wells recommended that the layout of the construction camp proposed at the Visskerskloof farmhouse be amended to avoid the historical components of the yard and incorporate a 25 m buffer around these components. The historical components of the yard must then be incorporated into the existing CMP.

3. Should the redesign of the proposed construction camp layout not be feasible, SARAO must undertake a Section 34 Destruction Permit Application process in compliance with Section 34 of the NHRA and Chapter III of GN R 548. The identified heritage and associated adjacent structures must be recorded in detail in support of the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. The post-mitigation scenario assumes that the infrastructure layout design will be amended.

4. Rock Art Heritage with Grade IIIB ratings must be maintained in situ. It is recommended that a minimum buffer of 50 m be established around all known Rock Art sites.

5. It is recommended that the Grade II corbelled buildings and successive farmhouses are to be retained and enhanced. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined cultural significance of the structures.

6. Any proposed demolition of Grade IIIA graded structures is subject to the requirements stipulated under Sections 27 & 34 of the NHRA and regulated by Chapter IV of GN R 548. It is recommended that the structures only be demolished to their existing floor level, i.e. removal of the walls and superstructure but keeping the building's footprint to prevent squatting and the need for maintenance. The graded structures and associated adjacent structures must be recorded in detail to support the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. Historic building materials were in existence and good condition (such as door and window frames or fireplaces), should be retained and made available for reuse for other historic structures in the area.

7. Grade II heritage resources should be considered a 'no-go' area. It is recommended that a 1km buffer around these resources be established and maintained throughout the Project life, within which no project-related activities may occur. The structures must be

recorded in detail through photographs and measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined cultural significance of the structures.

8. Adverse impacts to Grade IIIB structures should be avoided as far as possible, and a 50m buffer for IIIB resources established, respectively. It is recommended that these buffers be maintained throughout the Project life. The cultural significance of the structures is informed by their placement in the landscape (site) and association with associated buildings (context). These must be retained. Mitigation measures against potential negative impacts on the resources must be considered when avoiding the impacts themselves is not possible. It is recommended that these structures be recorded in detail through a photograph and measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined CS of the structures. Any proposed alterations of structures with a recommended III A and B grading are subject to the requirements stipulated under Section 34 of the NHRA and regulated by Chapter IV of GN R 548.

9. A suitably qualified archaeologist must undertake a Watching Brief during earth-moving activities in proximity to identified heritage sites to record all material culture remains that may be exposed. The results of the Watching Brief must be compiled into a Watching Brief Report and submitted to SAHRA for noting.

10. Signage for in situ heritage resources demarcated by a no-go buffer zone between heritage resources and project activities must be established to indicate the presence of the resource. The heritage resources must be included in the existing CMP

Final Decision and Comments from SAHRIS CaseID 12292 (Higgitt 2020)

The following comments were made as a requirement in terms of section 38(4) of the NHRA and must be included in the existing Conservation Management Plan (CMP):

1. 38(4)a – The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit has no objections to the proposed amendments to the development;

2. 38(4)b – The recommendations provided by the heritage specialists are supported and must be adhered to.

3. Additional further specific conditions are provided for the development as follows:

    - Watching Brief Reports must be submitted to the SAHRIS Case application upon completion of the construction phase;
    - The conditions provided in the Final Comment issued on 07/09/2018 are still valid (unless stated otherwise in this comment and specialist recommendations) and must be adhered to;
    - 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with the section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
    - 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be

alerted immediately as per section 36(6) of the NHRA. Non-compliance with the section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;

- 38(4)d – See section 51(1) of the NHRA;
- 38(4)e – The following conditions apply with regards to the appointment of specialists:

  Suppose heritage resources are uncovered during the course of the development. In that case, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment*
EIA:	Early Iron Age*
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
IA:	Iron Age
LSA:	Later Stone Age
MEC:	Member of the Executive Council
MIA:	Middle Iron Age
MPRDA:	Mineral and Petroleum Resources Development Act
MSA:	Middle Stone Age
NEMA:	National Environmental Management Act
NHRA:	National Heritage Resources Act
OWC:	Orange River Wine Cellars
PRHA:	Provincial Heritage Resource Agency
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations it must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological: material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.

Stone Age:	The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.
Earlier Stone Age:	>2 000 000 - >200 000 years ago
Middle Stone Age:	<300 000 - >20 000 years ago
Later Stone Age:	<40 000 - until the historical period
Iron Age:	(Early Farming Communities). Period covering the last 1800 years, when immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.
Early Iron Age:	AD 200 - AD 900
Middle Iron Age:	AD 900 - AD 1300
Later Iron Age:	AD 1300 - AD 1850
Historic:	Period of arrival of white settlers and colonial contact. AD 1500 to 1950
Historic building:	Structures 60 years and older.
Fossil:	Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.
Heritage:	That which is inherited and forms part of the National Estate (historic places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).
Heritage resources:	These mean any place or object of cultural significance, tangible or intangible.
Holocene:	The most recent geological period that commenced 10 000 years ago.
Palaeontology:	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces
Cumulative impacts:	"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Mitigation:	Anticipating and preventing negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.
A 'place':	a site, area or region;

- a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- an open space, including a public square, street or park; and
- in relation to the management of a place, includes the immediate surroundings of a place.

'Public monuments and memorials': mean all monuments and memorials—

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
- which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;

'Structures': any building, works, device or other facility made by people and which are fixed to land, and include any fixtures, fittings and equipment associated therewith.

1. INTRODUCTION

1.1. Scope of study

The project involves the extension of the SKA MeerKAT project in the Namakwa and Pixley Ka Seme District Municipalities in the Northern Cape. UBIQUE Heritage Consultants were appointed by CONCOR Construction as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage desktop assessment (AIA/HIA) of the development area.

The desktop assessment aims to identify and report any heritage resources that may fall within the development footprint; to summarised the determined impact of the proposed development on any sites, features, or objects of cultural heritage significance; to assess the significance of any identified resources; and to assist the developer in managing the documented heritage resources in an accountable manner, within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

South Africa's heritage resources are rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representation of a time or group; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardised by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous and accurate identification and effective management of heritage resources for present and future generations.

The result of this investigation is presented within this heritage desktop report. It comprises the recording of previously identified heritage resources present/absent and offers recommendations for managing these resources within the context of the proposed development.

1.2. Assumptions and limitations

It is assumed that the description of the proposed project, as provided by the client, is accurate. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage impact assessment.

The significance of the sites, structures and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the

evaluation of any site is done with reference to any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

Although all possible care has been taken during the intensive desktop study to identify sites of cultural importance within the development area, it is essential to note that some heritage sites may have been missed due to the limitations of the digital survey. The digital survey is dependent on available data sources and the visibility of heritage resources in satellite imagery. No field survey has been conducted, and all heritage sites/possibility of heritage features are based on the desktop study and digital survey. No sub-surface investigations (i.e. excavations or sampling) were undertaken since a permit from SAHRA is required for such activities. Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to assess the significance of the site (or material) in question.

2. TERMS OF REFERENCE

An HIA/AIA and screening report must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

In addition, the HIA/AIA and screening report should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

2.1. Statutory Requirements

2.1.1. General

The Constitution of the Republic of South Africa Act 108 of 1996 is the source of all legislation. Within the Constitution the Bill of Rights is fundamental, with the principle that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels the following legislation may be relevant:

- Physical Planning Act 125 of 1991
- Municipal Structures Act 117 of 1998
- Municipal Systems Act 32 of 2000
- Development Facilitation Act 67 of 1995 (DFA)

The identification, evaluation and management of heritage resources in South Africa are required and governed by the following legislation:

- National Environmental Management Act 107 of 1998 (NEMA)
- KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)
- National Heritage Resources Act 25 of 1999 (NHRA)
- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)

2.1.2. National Heritage Resources Act 25 of 1999

The NHRA established the South African Heritage Resources Agency (SAHRA) together with its Council to fulfil the following functions:

- coordinate and promote the management of heritage resources at the national level;
- set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- provide for the protection and management of conservation-worthy places and areas by local authorities.

2.1.3. Heritage Impact Assessments/Archaeological Impact Assessments

Section 38(1) of the NHRA of 1999 requires **the responsible heritage resources authority to notify the person who intends to undertake a development that fulfils the following criteria to submit an impact assessment report if there is reason to believe that heritage resources will be affected by such event:**

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity that will change the character of a site—
    - exceeding 5000m² in extent; or
    - involving three or more existing erven or subdivisions thereof; or
    - involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the rezoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

2.1.4. Definitions of heritage resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. These include, but are not limited to, the following wide range of places and objects:

- living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- Ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;

- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- public monuments and memorials;
- sites of significance relating to the history of slavery in South Africa;
- movable objects, but excluding any object made by a living person; and
- battlefields.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.

2.1.5. Management of Graves and Burial Grounds

- **Graves younger than 60 years** are protected in terms of Section 2(1) of the Removal of Graves and Dead Bodies Ordinance 7 of 1925 as well as the Human Tissues Act 65 of 1983.

- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are** protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

The **protocol for the management of graves older than 60 years situated outside a formal cemetery administered by a local authority** is detailed in Section 36 of the NHRA:

(3) *(a)* No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph *(a)* or *(b)* any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)*(a)* unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)*(b)* unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

3. STUDY APPROACH AND METHODOLOGY

3.1. Desktop study

The first step in the methodology was to conduct a desktop study of the heritage background of the area and the site of the proposed development. This entailed the scoping and reading of historical texts/records as well as previous heritage studies and research around the study area.

3.1.1. Literature review

A survey of the literature was undertaken to obtain background information regarding the area. Through researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (http://www.sahra.org.za/sahris), it was determined that several other archaeological or historical studies had been performed within the broader vicinity of the study area.

The study area is contextualised by incorporating data from previous CRM reports done in the area and an archival search. The objective of this is to extract data and information on the area in question, looking at archaeological sites, historical sites, and graves in the area. In addition, a concise account of the archaeology and history of the broader study area was compiled from available sources, including those listed in the bibliography.

3.1.2. Determining significance

Levels of significance of the various types of heritage resources observed and recorded in the project area will be determined to the following criteria:

Cultural significance:

- Low	A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium	Any site, structure or feature being regarded as less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High	Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorised as of a high importance. Likewise, any important object found within a specific context.

Heritage significance:

- Grade I	Heritage resources with exceptional qualities to the extent that they are of national significance

- Grade II	Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate
- Grade III	Other heritage resources of local importance and therefore worthy of Conservation

Field ratings:

i.	National Grade I	significance should be managed as part of the national estate
ii.	Provincial Grade II	significance should be managed as part of the provincial estate
iii.	Local Grade IIIA	should be included in the heritage register and not be mitigated (high significance)
iv.	Local Grade IIIB	should be included in the heritage register and may be mitigated (high/ medium significance)
v.	General protection A (IV A)	site should be mitigated before destruction (high/ medium significance)
vi.	General protection B (IV B)	site should be recorded before destruction (medium significance)
vii.	General protection C (IV C)	phase 1 is seen as sufficient recording and it may be demolished (low significance)

Heritage value, statement of significance:

a. its importance in the community, or pattern of South Africa's history;

b. its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;

c. its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;

d. its importance in demonstrating the principal characteristics of a particular class of south Africa's natural or cultural places or objects;

e. its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;

f. its importance in demonstrating a high degree of creative or technical achievement at a particular period;

g. its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;

h. its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and

i. sites of significance relating to the history of slavery in South Africa.

3.1.3. Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves, or enhances a heritage resource by minimising natural site erosion or facilitating non-destructive public use. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect and cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on possible identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered, and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact	Low	No irreplaceable resources will be impacted.

Criteria	Rating Scales	Notes
on irreplaceable resources	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium, and all three other criteria are rated low.
	Medium	Intensity is medium, and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

3.2. Report

The results of the desktop research are compiled in this report. The identified heritage resources and anticipated and cumulative impacts that the development of the proposed project may have on the identified heritage resources is presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments and results comply with the

relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in managing the documented heritage resources in a responsible manner and protecting, preserving, and developing them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by CONCOR Construction as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) to conduct a cultural heritage desktop assessment to determine the impact of the Square Kilometre Array/Karoo Array Telescope (SKA MeerKAT) extension on the Farms Mey's Dam Re/68, Brak Puts RE/66, Swartfontein RE/496 and Swartfontein 2/496, in the Kareeberg Local Municipality, Pixley Ka Seme District Municipality, and the Farms Los Berg 1/73 and Groot Paardekloof RE/74, in the Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province on any possible sites, features, or objects of cultural heritage significance.

The South African Radio Astronomy Observatory Square Kilometre Array project comprises two primary components, namely the 'core' (36 land parcels) and three 'spirals' (73 land parcels) covering an approximate areal extent of 211 000 hectares (ha). This land provides the SKA Radio Telescope site, KAT-7 radio telescope, MeerKAT, HIRAX and HERA instruments.

The SKA1_MID Project in South Africa includes the following:

- Up to 133 dishes and associated infrastructure, power and fibre. The 64 dish MeerKAT radio telescope will be incorporated to form part of the SKA1_MID Project. There will be a total of 197 dishes;

SKA1_MID Correlator located on-site;

- Telescope Manager;
- Science Data Processor located at the SKA Science Processing Centre in Cape Town;
- SKA Engineering Operations Centre located at Klerefontein on the site;
- SKA Science Operations Centre located in Cape Town.

The scope of the MeerKAT radio telescope expansion includes:

- Installation of 20 SKA1 dishes – 16 of these dishes form part of the MeerKAT project, and four dishes are early production dishes that form part of SKA AA0.5;
- Power, fibre and antenna foundations for 24 dishes.

4.1. Technical information

Project description	
Project name	Phase 1 AIA Heritage Desktop Study SKA Meerkat Extension Northern Cape
Description	The expansion of the Square Kilometre Array (SKA) MeerKAT project on the Farms Mey's Dam RE/68, Brak Puts RE/66, Swartfontein RE/496 and Swartfontein 2/496, in the Kareeberg Local Municipality, Pixley Ka Seme District Municipality, and the Farms Los Berg 1/73 and Groot Paardekloof RE/74, in the Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province.
Developer	
CONCOR Construction	
Property details	
Province	Northern Cape
District municipality	Pixley Ka Seme District Municipality

	Namakwa District Municipality
Local municipality	Kareeberg Local Municipality Karoo Hoogland Local Municipality
Topo-cadastral map	1:50 000 3021CB, 3021CD, 3021DA
Farm name	Mey's Dam RE/68; Brak Puts RE/66; Swartfontein RE/496; Swartfontein 2/496; Los Berg 1/73; Groot Paardekloof RE/74
Closest town	Williston, Brandvlei, Carnarvon, Vanwyksvlei
Development footprint size	33065.535 ha
Land use	
Previous	Stock farming
Current	Various
Rezoning required	No
Sub-division of land	No

Development criteria in terms of Section 38(1) NHRA	Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ².	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ².	No
Any other development category, public open space, squares, parks, recreation grounds.	No

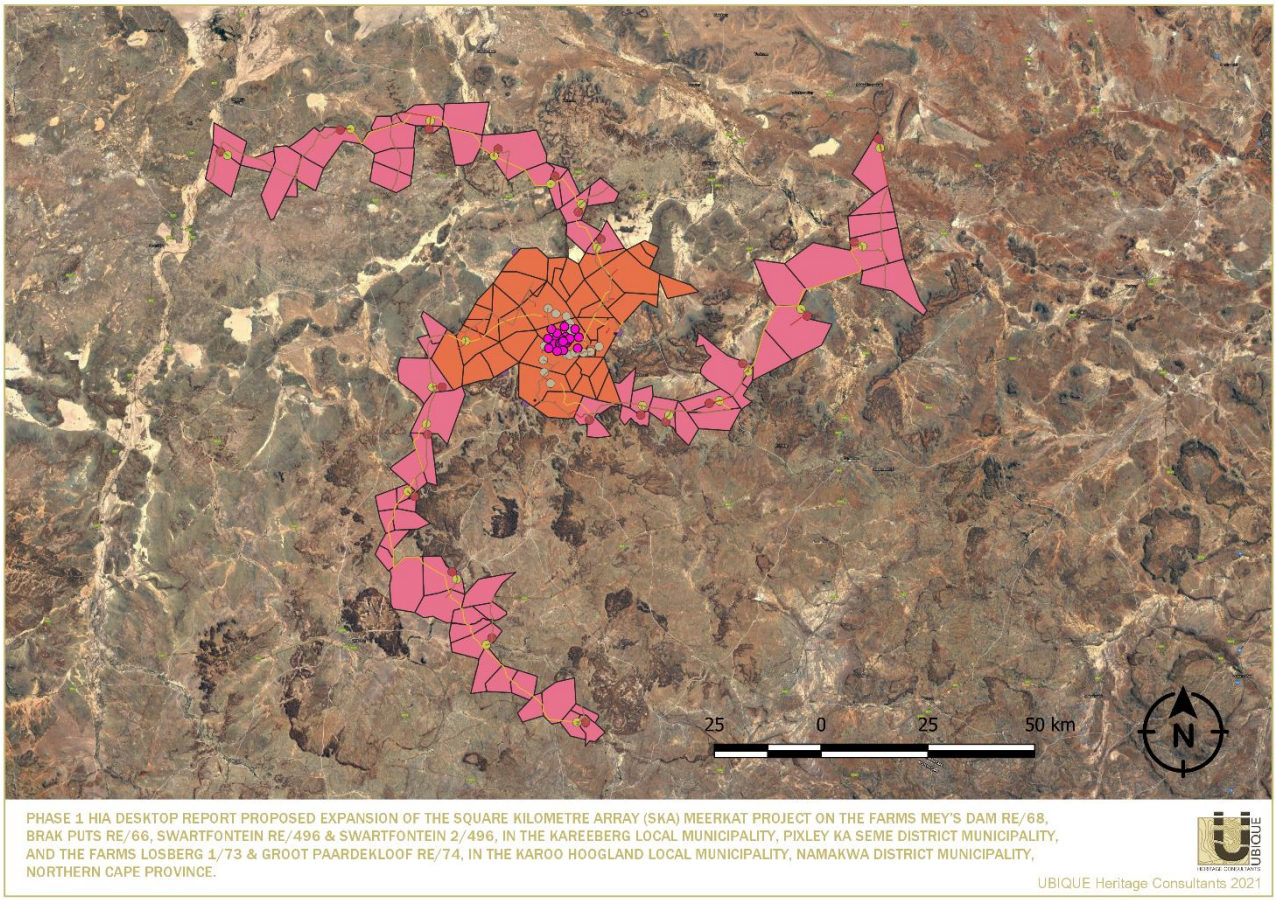

Figure 1 *Locality of the Square Kilometre Array/Karoo Array Telescope (SKA MeerKAT) project indicated on Google Earth Satellite imagery.*

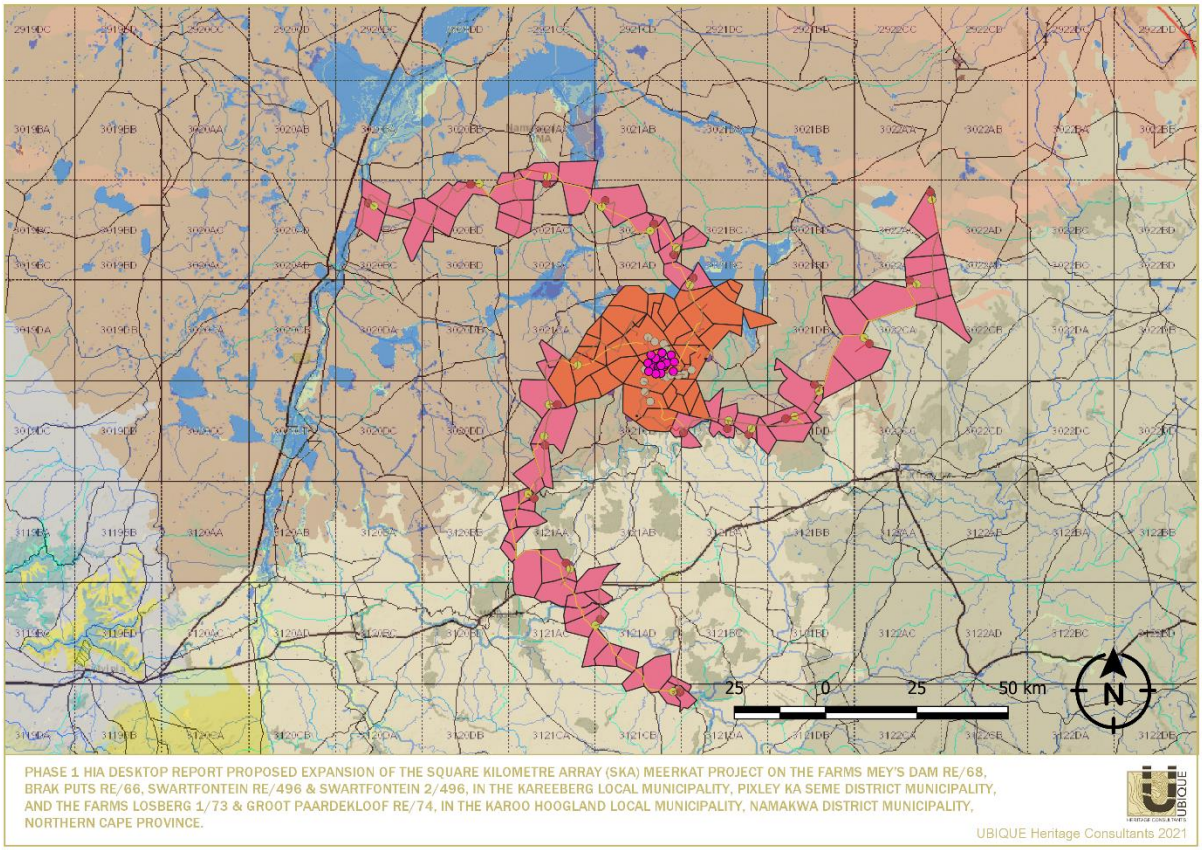

Figure 2 *Locality of the Square Kilometre Array/Karoo Array Telescope (SKA MeerKAT) project Topo-cadastral map.*

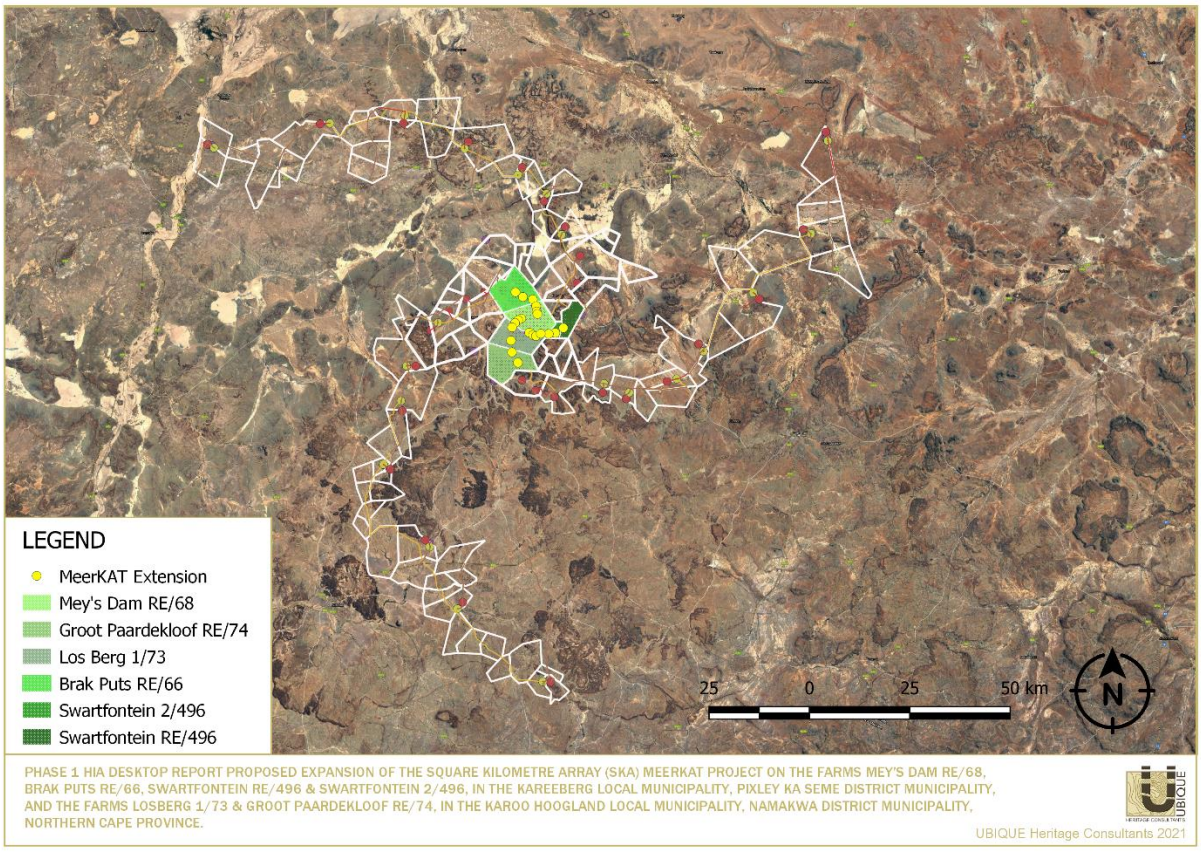

Figure 3 *Locality of the SKA MeerKAT extension, indicated on Google Earth Satellite imagery.*

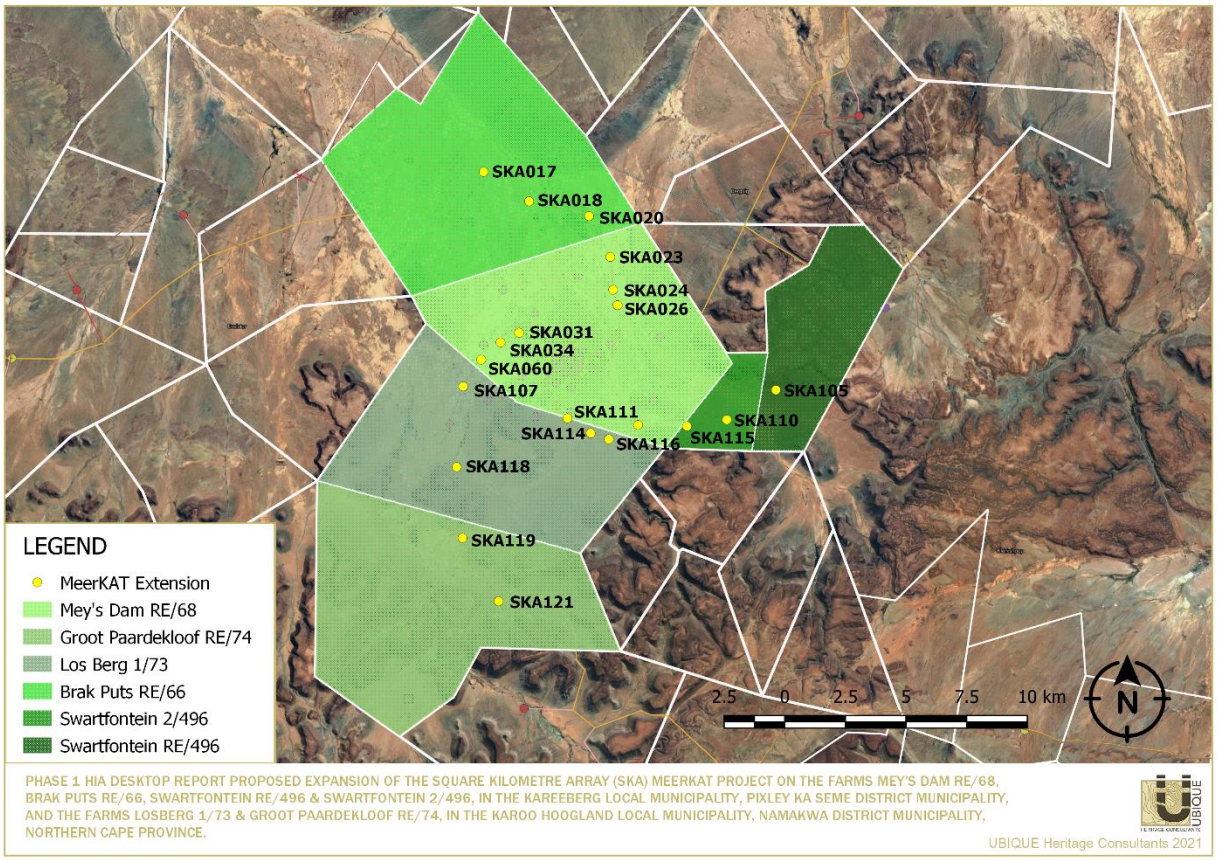

Figure 4 *SKA MeerKAT extension detail.*

4.2. Description of the affected environment

The SKA1_MID SEA study area is contained within the Karoo Central Astronomy Advantage Area 1 (KCAAA1) in the Bo-Karoo (Upper Karoo), which is part of the Great Karoo, a vast semi-arid area of the Northern Cape Province. This area falls within the Bushmanland Basin Shrubland, the Upper Karoo Hardeveld, and Western Upper Karoo vegetation types. The Bushmanland Basin Shrubland Slightly is characterised by irregular plains with dwarf shrubland dominated by a mixture of low sturdy and spiny (and sometimes also succulent) shrubs (*Rhigozum*, *Salsola*, *Pentzia*, *Eriocephalus*), 'white' grasses (*Stipagrostis*) and in years of high rainfall, and abundance of annuals such as species of *Gazania* and *Leysera*. The vegetation and landscape features of the Upper Karoo Hardeveld include steep slopes of koppies, buttes, mesas and parts of the Great Escarpment covered with large boulders and stones supporting sparse dwarf Karoo scrub with drought-tolerant grasses of genera such as *Aristida, Eragrostis* and *Stipagrostis*. The dissected landscape of the Western Upper Karoo is associated with the tributaries of the upper catchment of the Sak River (e.g. Renoster River, Riet River, Klein Sak River) in the southwest. A mixture of small-leaved shrubs and shrubby succulents (*Brownanthus*, *Drosanthemum*, *Ruschia*) with drought-resistant (mostly 'white') grasses is the determinant feature of the vegetation structure (Mucina & Rutherford 2006).

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

South Africa has a very long and varied history of human occupation (Deacon & Deacon 1999). This occupation date to approximately 2mya (million years ago) (Mitchell 2002). Briefly, the archaeology of South Africa can be divided into three "major" periods, namely: the Stone Age, the Iron Age and the Historical period. Numerous archaeological and historical sites have been identified and documented throughout South Africa.

From previous heritage impact studies (Bluff et al. 2020; Hardwick et al. 2020) and research (e.g., Humphreys & Thackery 1983; Parsons 2008; Orton 2012), the area is currently known to comprise tangible and intangible heritage resources. Therefore, this section will provide a short description of the archaeological and historical context of the area for this report.

5.1. Region

The archaeological record of the area is associated with the Early Stone Age (>200ka to ~2 ma.), Middle Stone Age (>20 to <300 ka) and the Later Stone Age (<40 000 BP) (Lombard et al. 2012; Dusseldorp et al. 2013) as well as the colonial eras of the 17th to 20th centuries (e.g., Mitchell 2002; Giliomee & Mbenga 2007). In general, lithic industries retrieved from sites dating to the Early Stone Age are associated with hominins such as *H. ergaster*, *H. habilis*, *H. erectus* and archaic *H. sapiens*. Sites dating from the early Middle Stone Age and Middle Stone Age were created by *H. sapiens* and/or *archaic H. sapiens* (e.g., Dusseldorp et al. 2013). Later Stone Age sites were occupied by hunter-gatherers/herder communities, who interacted with Iron Age farmers during the ceramic Final Later Stone Age (Huffman 2007) and throughout the colonial era with European settlers (e.g., Mitchell 2002; Giliomee & Mbenga 2007).

5.1.1. Stone Age

In short, the Stone Age refers to humans that mainly utilised stone as their technological marker. Each sub-division represents a group of industries where the assemblages share attributes or common traditions (Coertze & Coertze 1996; Lombard et al. 2012). The ESA is characterised by flakes produced from pebbles, cobbles and percussive tools, as well as objects created later during this period, such as large hand axes, cleavers and other bifacial tools (Klein 2000). The MSA is associated with small flakes, blades and points. The aforementioned is generally inferred to have been made and utilised for hunting activities and had numerous functions (Wurz 2013). Lastly, the LSA is characterised by microlithic stone tools, scrapers and flakes (Binneman 1995; Lombard et al. 2012). The LSA is also associated with rock art.

Hunter-gatherer lifeways are attested to in the Middle Stone Age record for at least the last 100 000 years or so (Wadley 2015). Such foraging groups continue to occupy the landscape throughout the Later Stone Age that started in the region between 40 000 and 20 000 years ago, lasting until a couple of centuries ago. About 2000 years ago, during the final ceramic LSA, the first evidence for ovicaprids (goats and sheep) was found in southern Africa, possibly associated with Khoekhoe herding groups (e.g., Sadr 2008). These groups came into being a combination of the migration of East African pastoralists who admixed with local hunter-gatherers (Salas et al. 2002; Schlebusch et al. 2013). It is almost impossible to differentiate between San and Khoekhoe groups based on either archaeological and genetic records (see Veldman 2014 for

synthesis). Presently these populations are referred to as Khoisan (inclusive of /Xam, San, Korana and Griqua peoples) (Barnard 1992).

In general, stone tools associated with ESA deposits within the Northern Cape Province, such as at Wonderwerk Cave (Humphreys & Thackeray 1983) and Kathu Pan (e.g., Lukich et al. 2019), may include cores, flakes, hand axes and cleavers (Porat et al. 2010; Chazan 2015). The MSA include Levallois or prepared core techniques, flakes, intentional blade production. Formal tools consist of retouched points, backed artefacts and scrapers (e.g., Humphreys & Thackery 1983). The LSA includes a wide variety of diagnostic lithics, such as scrapers, backed tools, awls, reamers, points, segments, blades and bladelets (e.g., Beaumont et al. 1995; Parsons 2008). Other material culture associated with Khoisan communities of the LSA include pendants and/or beads made from bone or ostrich eggshell. During the final ceramic LSA, thin-walled pottery appears in the archaeological record, which coincides with the introduction of livestock (e.g., Sadr 2008).

Khoisan rock art and engravings depict realistic and surreal imagery of animals, animal footprints, human figures and anatomy, and geometric shapes. Also, some artistic scenes represent social and political activities, such as dancing, hunting and skirmishes with other communities. However, insight into San rock art studies in southern Africa is based on ethnographic information obtained from past informants (e.g., Bleek & Lloyd 1911). Archaeologists interpret rock art as an artistic expression of Khoisan world-views and shamanism (e.g., Lewis-Williams & Dowson 1999; Ouzman & Smith 2004; Eastwood & Smith 2005).

5.1.2. Iron Age

The Iron Age (IA) is characterised by the use of metal (Coertze & Coertze 1996: 346). There is some controversy about the periods within the IA. Van der Ryst & Meyer (1999) have suggested that there are two phases within the IA, namely:

- Early Iron Age (EIA) 200 – 1000 AD
- Late Iron Age (LIA) 1000 – 1850 AD

However, Huffman (2007) suggests that there are three periods within the Iron Age:

- Early Iron Age (EIA) 200 – 900 AD
- Middle Iron Age (MIA) 900 – 1300 AD
- Late Iron Age (LIA) 1300 – 1850 AD.

Thomas Huffman believes that the Middle Iron Age should be included within this period; his dates have been widely accepted in the IA field of archaeology.

The South African Iron Age consists of farming communities that had domesticated animals, cultivated plants, manufactured and made ceramics and beads, smelted iron for weapons and manufactured tools (Hall 1987). Iron Age people were often mixed farmers/agropastoralists. These agropastoralists generally chose to live in areas with sufficient water for domestic use along with arable soil that could be cultivated with an iron hoe. Most Iron Age (IA) settlements were permanent settlements, consisting of features such as houses, raised grain bins, storage pits and animal kraals/byres; this contrasts with the temporary camps of pastoralists and hunter-gatherers (Huffman 2007). It is evident in the archaeological record that IA groups had migrated with their material culture (Huffman 2002).

After European expansion into the region, Xhosa-speaking communities also settled in the district. The first records of the Xhosa in the regional study area suggest they settled in the vicinity of the Orange River around 1795. They migrated in search of independence from the Cape Colony and exploited the cattle and ivory trade to the north, made possible through the introduction of arms and ammunition. By the end of the 18th century, the Northern Cape had become a refuge for many people, including traders, deserters, and criminals of various linguistic groups (Anderson 1985; Penn 1995; Giliomee & Mbenga 2007). There was also an influx of Sotho and Tswana-speakers fleeing from the Mfecane during the 1820s (Anderson 1985; Penn 1995; Parkington et al. 2019).

5.1.3. Historical period

Until the onset of European exploration and eventual settlement at modern-day Cape Town during the 17th century (e.g., Giliomee & Mbenga 2007), the Northern Cape region was occupied by Khoisan communities (e.g., Barnard 1992; Beaumont et al. 1995; Parsons 2008), reflected by the material culture discussed in the preceding paragraphs.

The historical era of the Northern Cape is best described as an assortment of events that had a socio-political and socio-economic impact on the indigenous and settler communities. These included client-labour relationships, inter-marriages, political alliances, slavery, trading, criminality, skirmishes, raids, competition for scarce resources such as grazing pasture and water, and ultimately frontier warfare between all groups. Conflict and who fought with whom depended on fluctuating political alliances and socio-political agendas (Anderson 1985; Penn 1995; Parkington et al. 2019).

By 1813 the Cradock Proclamation allowed for the settlement of the land. During this period, the first permanent structures were constructed using stones as the region is devoid of trees. The result was a vernacular architecture known as corbelled buildings and, during later years, rectangular farmhouses (Anderson 1985; Penn 1995; Kramer 2011). By 1860, Carnarvon became a formal settlement divided into erven and became a predominantly white community. Ultimately, historic actions led to the acculturation and loss of land for indigenous communities (Anderson 1985; Penn 1995). Currently, descendants reside in the Northern Cape, and it is hoped that the local impoverished communities will benefit from the SKA project (Parkington et al. 2019).

6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENTS

6.1. Heritage sensitivity in the region

The Heritage Screening tool (https://screening.environment.gov.za/) was used to complement the assessment of the study area's heritage sensitivity. Figure 5 indicates that the area surrounding the SKA1_MID Project have loci of high sensitivity.

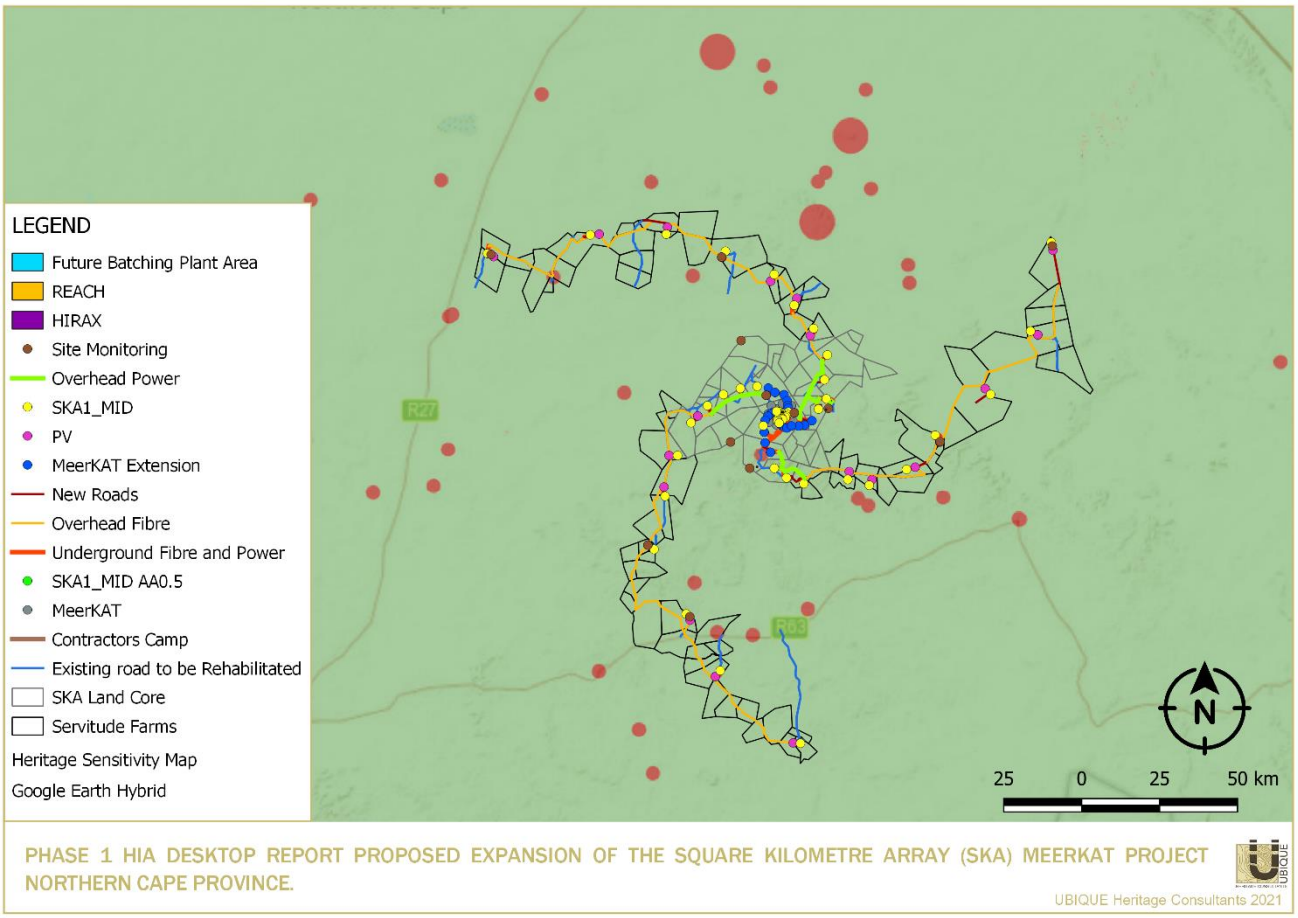

Figure 5 *The SKA1_MID Project Heritage Screening tool (https://screening.environment.gov.za/)*

6.2. Identified heritage resources

The Phase 1 HIA desktop assessment cumulated the heritage resources identified by CRM practitioners conducting field surveys in 2016 and 2018 throughout the development footprint of the SKA1_MID Project. The following table summarises their field ratings and mitigation recommendations that were made during their initial impact assessment.

Some GPS location coordinates were not disclosed in the reports to protect sensitive, especially rock art sites.

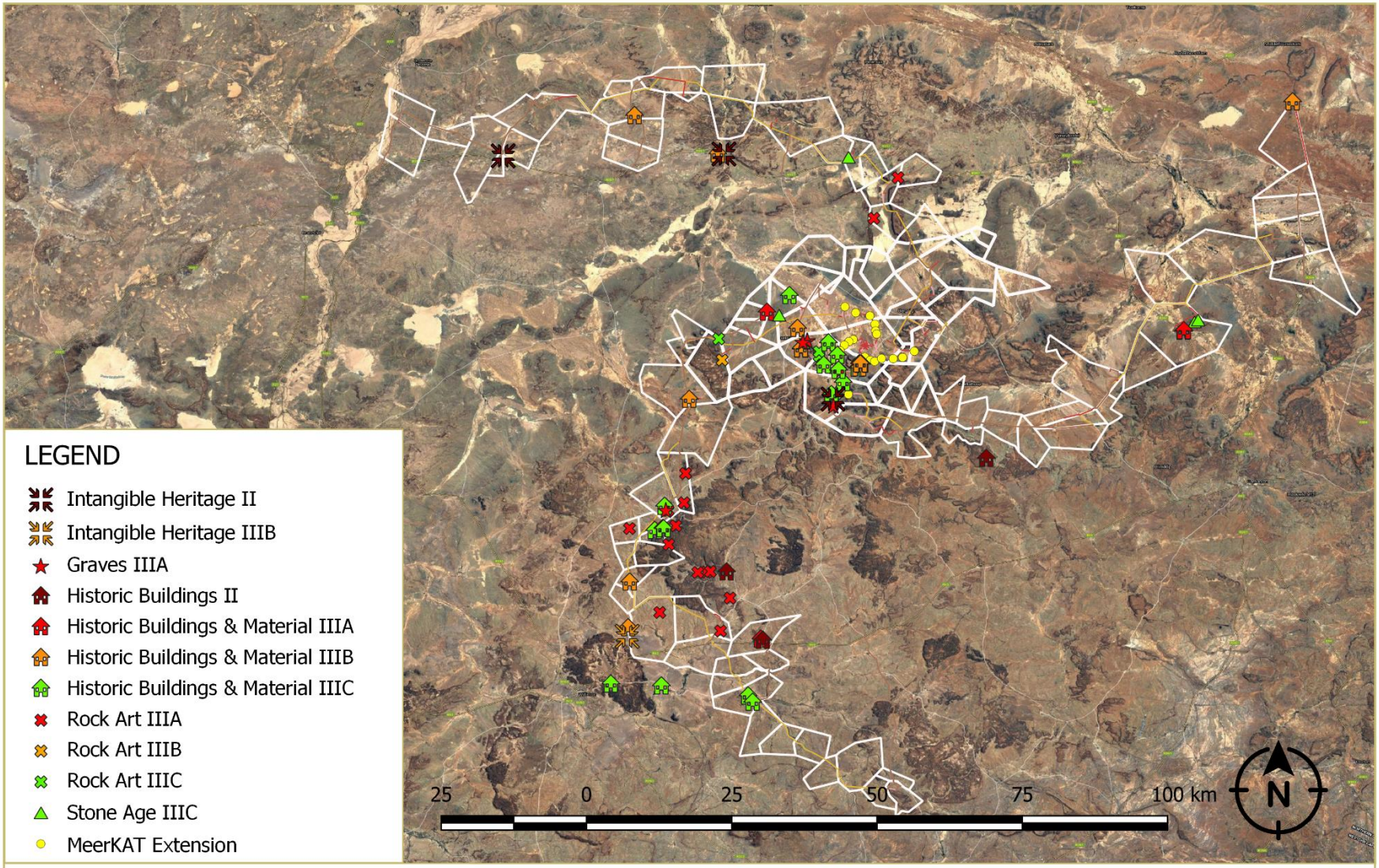

Figure 6 *Identified heritage resources across the SKA1_MID Project footprint, low significance (green), medium significance (orange) and high significance (red, dark red).*

Stone Age Resources Identified

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93438 HER-SKA002	Type lithic/s	Random	MSA	**-30.66584, 22.04248**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Raw material	Hornfels			
	N in m².				
	Context	Surface scatter			
	Additional	1m from fibre optic cable route			
93462 HER-SKA054	Type lithic/s	Scatter	LSA	**-30.65634, 21.28707**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Raw material				
	N in m².				
	Context	8m from the station			
	Additional				
93502 HER-SKA063	Type lithic/s	Cobble cluster	no info	**-30.668464, 22.040806**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Raw material	Dolerite			
	N in m².				
	Context	34m from existing road			
	Additional				
93503 HER-SKA064	Type lithic/s	Scatter	MSA	**-30.665071, 22.047313**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Raw material				
	N in m².	Large			
	Context	130m from the road - 250 from station			
	Additional				
93517 HER-SKA078	Type lithic/s	scatter	LSA	**-30.706135, 21.375672**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Raw material				
	N in m².				
	Context	2.7km from the station			
	Additional				
93518 HER-SKA079	Type lithic/s	scatter	LSA	**-30.705973, 21.375757**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Raw material				
	N in m².				
	Context	2.7km from the station			
	Additional				
93519 HER-SKA080	Type lithic/s	scatter	LSA	**-30.706061, 21.376042**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Raw material				
	N in m².				
	Context	2.7km from the station			
	Additional				
93499 HER-SKA009	Type lithic/s	scatter	no info	**-30.794115, 21.391754**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Raw material	Hornfels			
	N in m².				
	Context	50m from the road			
	Additional				
	Type lithic/s	Stone Age scatter		**-30.369687,**	**Grade IIIc**

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93505 HER-SKA066	Raw material			21.412965	Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	N in m².				
	Context				
	Additional				

Rock Art Resources Identified

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93437 (HER-SKA003)	Type of site	Garst Kolk rock engraving 01	LSA		**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - this is located only 6m from the road - upgrade may impact the site significantly. Full recording and fencing during the upgrading of the road are necessary. Mitigation operational: If the road is not situated more than 50m away, annual monitoring for the condition of the rock art to assess whether it has been affected by the dust is required. The amount of traffic on the road will impact the conservation of the site. It is, however, expected traffic on these roads to be minimal.
	Style	Engraving			
	N in m²				
	Context	Open-air			
	Additional	6m from satellite			
93439 (HER-SKA003)	Type of site	Garst Kolk rock engraving 02	LSA	-30.66148, 22.04439	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - located on a koppie - no impact is expected. Mitigation operational: None
	Style	Engraving			
	N in m²				
	Context	Open-air			
	Additional	90m from existing road			
93436 (HER-SKA005)	Type of site	Garst Kolk rock engraving 03	LSA	-30.662411, 22.04308	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - located on a koppie - no impact is expected. Mititagion operational: None
	Style	Engraving			
	N in m²				
	Context	Open-air			
	Additional	150m from existing road			
93441 (HER-SKA006)	Type of site	Garst Kolk rock engraving 04	LSA	-30.662603, 22.042624	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style	Engraving			
	N in m²				
	Context				
	Additional				
93454 (HER-SKA013)	Type of site	Engraving with artefacts	LSA	-30.7992, 21.38362	**Grade IIIa** High local significance (SEA 2016)

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	Style	Engravings			Mitigation Construction: Avoid Mitigation Operational: If the road is not situated more than 50m away, annual monitoring for the condition of the rock art to assess whether it has been affected by the dust is required. The amount of traffic on the road will impact on the conservation of the site. It is, however, expected traffic on these roads to be minimal.
	N in m²				
	Context	30m from existing road			
	Additional	Engraving of an Eland;			
93495 (HER-SKA044)	Type of site	De Hoek rock engraving 01		**-30.75452, 21.39637**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Operational: None
	Style				
	N in m²				
	Context				
	Additional	140m from existing road			
93475 (HER-SKA045)	Type of site	De Hoek rock engraving 02		**-30.75537, 21.39776**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Operational: None
	Style				
	N in m²				
	Context				
	Additional	140m from fibre optic cabling			
46491 (KAT005)	Type of site	KAT_Prins 005 Rock art		**-30.742724, 21.43008**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional				
90192 (GTK 001)	Type of site	Groot Kolk 001 Rock art		**-30.40415, 21.50278**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	100 m from existing road			
90175 (OEST001)	Type of site	Rock art Oest 001		**-31.008265, 21.085551**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional				
90176 (DSK001)	Type of site	Dassiekloof 001 Rock art		**-30.994261, 21.114588**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional				
90186 (JTP001)	Type of site	Jagt Pan 001 Rock Art		**-30.478004, 21.458967**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style				
	N in m²				
	Context				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	Additional				
201601 (HRA 1-6)	Type of site	Hykkerud rock art sites 1 to 6		**-31.19334772, 21.07043742**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 1 km from proposed infrastructure			
201602 (HRA 7)	Type of site	Hykkerud rock art sites 7		**-31.16721613, 21.19796173**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	430 m from proposed infrastructure			
201603 (HRA 8)	Type of site	Hykkerud rock art sites 8		**-31.12011671, 21.15537457**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 2 km from proposed infrastructure			
201604 (HRA 9 & 11)	Type of site	Hykkerud rock art sites 9 and 11		**-31.12077241, 21.13947492**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 3 km from proposed infrastructure			
201605 (HRA 10)	Type of site	Hykkerud rock art sites 10		**-31.119, 21.1624**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 1 km from proposed infrastructure			
201606 (HRA 12-13)	Type of site	Hykkerud rock art sites 12 to 13		**-31.07, 21.0868**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 3 km from proposed infrastructure			
201607 (HRA 14-16)	Type of site	Hykkerud rock art sites 14 to 16		**-31.041, 21.0156**	**Grade IIIa** High local significance (SEA 2016)
	Style				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	N in m²				Mitigation Construction: Avoid Mitigation Operational: None
	Context				
	Additional	More than 2 km from proposed infrastructure			
201608 (HRA 17-18)	Type of site	Hykkerud rock art sites 17 to 18		**-31.227, 21.1808**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	300 m from proposed Infrastructure			
201610 (HRA 20)	Type of site	Hykkerud rock art sites 20		**-30.941, 21.1174**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	More than 1 km from proposed infrastructure			
201611 (HRA 21-43)	Type of site	Hykkerud rock art sites 21 to 43		**-31.036, 21.0996**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - a buffer of 150m around the site Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional	160 m from proposed Infrastructure			
93451 (HERSKA046) De Hoek rock engraving 03	Type of site	Rock engraving		**-30.75488, 21.39677**	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Style				
	N in m²				
	Context	100m from existing road			
	Additional				
93510 (HER-SKA071)	Type of site	Rock engraving		**-30.755871, 21.395016**	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid. The site must be fenced off during the construction phase to avoid any unwanted damage to the site. Mitigation Operational: None
	Style	Eland with flat horns			
	N in m²				
	Context	28m from fibre cable route			
	Additional				
93791 (HER-SKA083)	Type of site	Rock engraving		**-30.735133, 21.1836**	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid - if not possible the site needs to be mitigated sufficiently by an archaeologist. Mitigation Operational:
	Style				
	N in m²				
	Context	90m from satellite station and 35m from MV underground			
	Additional				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93466 (HER-SKA048)	Type of site	Rock Art		**-30.72764, 21.35971**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style	Engraving			
	N in m²				
	Context				
	Additional				
93514 (HER-SKA075)	Type of site	Rock engraving		**-30.756544, 21.395509**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Avoidance might be difficult in this instance since the boulder is located in very close proximity to the road. Mitigation Operational: None
	Style	Scratched			
	N in m²				
	Context	1m from the road			
	Additional				
9356 (HER-SKA077)	Type of site	Rock engraving		**-30.72, 21.359506**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style	Scraped			
	N in m²				
	Context				
	Additional				
93507 (HER-SKA068)	Type of site	Rock engraving		**-30.799453, 21.384056**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Style	Scratched			
	N in m²				
	Context	70m from existing road			
	Additional				
89920 (KAT005.1)	Type of site	Rock art		**-30.74282, 21.43054**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Style				
	N in m²				
	Context				
	Additional				
93506 (HER-SKA067)	Type of site	Rock engraving		**-30.797075, 21.389394**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Style	Scratched			
	N in m²				
	Context	200m from the road			
	Additional				
93508 (HER-SKA069)	Type of site	Rock engraving		**-30.799039, 21.384166**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Style	Scratched			
	N in m²				
	Context	30m from the road			
	Additional				
93512 (HER-SKA073)	Type of site	Rock engraving		**-30.755807, 21.394522**	**Grade IIIc** Low local significance (SEA 2016)
	Style	Scratched			

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	N in m²				
	Context	70m from fibre cable route			Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Additional				
93513 (HER-SKA074)	Type of site	Rock engraving		**-30.756046, 21.39559**	**Grade IIIc** Low local significance (SEA 2016)
	Style	Scratched			
	N in m²				Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded. Mitigation Operational: None
	Context	20m from fibre cable route			
	Additional				
93515 (HER-SKA076)	Type of site	Rock engraving		**-30.756674, 21.395938**	**Grade IIIc** Low local significance (SEA 2016)
	Style	Scratched			
	N in m²				Mitigation Construction: Avoid - if not possible the site has been sufficiently recorded - avoidance might be difficult in this instance since the boulder is located in very close the proximity of the road. Mitigation Operational: None
	Context	7m from the fibre cable route			
	Additional				
93521 (HER-SKA081)	Type of site	Rock engraving		**-30.696854, 21.17729**	**Grade IIIc** Low local significance (SEA 2016)
	Style	Scratched			
	N in m²				Mitigation Construction: The site is sufficiently recorded. Mitigation Operational: None
	Context	10m from the road			
	Additional				

Historical Period Resources Identified

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
27177 (9/2/107/0003)	Type of feature	Corbelled building	Historic	**-31.245752, 21.257514**	**Grade II** Significant in the context of the province (SEA 2016) No mitigation Required
	Material				
	N in m².				
	Context				
	Additional				
27174 (9/2/107/0005)	Type of feature	Corbelled building	Historic	**-31.121828, 21.191884**	**Grade II** Significant in the context of the province (SEA 2016) Mitigation construction: Avoid - ideally, a 1km buffer zone should be respected around the site. If this is not possible, the heritage specialist must be consulted in order to identify possible solutions. Mitigation operational: None
	Material				
	N in m².				
	Context				
	Additional				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
29000 (9/2/019/0004)	Type of feature	Corbelled house complex	Historic	**-30.915783, 21.663084**	**Grade II** Significant in the context of the province (SEA 2016) No mitigation required
	Material				
	N in m².				
	Context				
	Additional				
93440 (HER-SKA001)	Type of feature	Garst Kolk Farmstead	Historic	**-30.684077, 22.02158**	**Grade IIIa** High local significance (SEA 2016) No mitigation required
	Material				
	N in m².				
	Context				
	Additional	Burial Grounds and Graves, Deposit, Building			
93450 (HER-SKA041)	Type of feature	Banksfontein corbelled house		**-31.243739, 21.254007**	**Grade IIIa** High local significance (SEA 2016) No mitigation required
	Material				
	N in m².				
	Context				
	Additional				
93473 (HER-SKA055)	Type of feature	Farmstead ruins		**-30.650545, 21.26511**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - upgrade of the road may indirectly impact on structure -workmen should be aware not to damage the structures. Mitigation Operational: A conservation architect should draw up a management plan for its maintenance as part of the SKA properties
	Material				
	N in m².				
	Context				
	Additional	25m from existing road Ruin > 100 years			
93470 (HER-SKA056)	Type of feature	Farmstead		**-30.69116, 21.20475**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: A conservation architect should draw up a management plan for its maintenance as part of the SKA properties
	Material				
	N in m².				
	Context				
	Additional	Deposit, Ruin Building, Burial Grounds and Graves, Stonewalling. > 100 years. 25m from existing road			
93472 (HER-SKA030)	Type of feature	Grootfontein farmstead with associated infrastructure		**-31.04596, 21.054772**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - since it is very close to the road, any upgrade must ensure that the site is not impacted. Since the graves are not close to the road, fencing is not necessary. Mitigation Operational: None
	Material				
	N in m².				
	Context	15m from existing road			
	Additional	Burial Grounds and Graves, Ruin > 100 years, Stonewalling			
93490 (HER-SKA031)	Type of feature	Brownslaagte corbelled house		**-31.170708, 21.019528**	**Grade IIIa** High local significance (SEA 2016)

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	Material				Mitigation Construction: Avoid Mitigation Operational: None
	N in m².				
	Context	86m from existing road			
	Additional	Ruin > 100 years, Stonewalling			
93480 (HER-SKA040)	Type of feature	Langbaken farmstead		**-31.358751, 21.239287**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid - no impact is expected on the farmstead and its components. The possible upgrade of the road should avoid affecting this site. Mitigation Operational: None
	Material				
	N in m².				
	Context	110m from existing road			
	Additional	Burial Grounds and Graves, Building, Stonewalling			
93520 (HER-SKA053)	Type of feature	Farmscape		**-30.646332, 21.271484**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: A conservation architect should draw up a management plan for its maintenance as part of the SKA properties
	Material				
	N in m².				
	Context				
	Additional	Deposit, Stonewalling, Building			
46492 (WILLIS001) WILLISTON001	Type of feature	Cultural material		**-30.71533, 21.32102**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
46497 (WILLIS006) WILLISTON006	Type of feature	Building		**-30.70143, 21.33566**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: A conservation architect should draw up a management plan for its maintenance as part of the SKA properties
	Material				
	N in m².				
	Context	26m from existing road			
	Additional				
46499 (WILLIS008) WILLISTON008	Type of feature	Cultural material		**-30.70586, 21.37615**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
46500 (WILLIS009) WILLISTON009	Type of feature	Cultural material		**-30.7317, 21.38389**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
32874 (9/2/019/4 Stuurmansfontein)	Type of feature	Corbelled House Complex		**-30.913114, 21.656633**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	Additional				
24913 (Banksfontein)	Type of feature	Corbelled building		-31.169872, 21.214219	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
24925 (Brownslaagte)	Type of feature	Corbelled building		-31.170635, 21.01935	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Material				
	N in m².				
	Context	100m from existing road			
	Additional				
93435 (HER-SKA007) Wolfwerf	Type of feature	Ruin > 100 years, Stonewalling		-30.363269, 21.175718	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid - fence off during construction phase if necessary Mitigation Operational: None
	Material				
	N in m².				
	Context	30m from existing road			
	Additional				
93448 (HER-SKA008) Jan Louws Kolk stone kraal	Type of feature	Stonewalling, Deposit, Burial Grounds and Graves		-30.2936, 21.02477	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid - the site is located in very close proximity of the existing road, the fibre optic cable route and additional proposed infrastructure. If avoidance with a 25m buffer zone is not possible, then detailed recording of the site is required. Mitigation Operational: None
	Material				
	N in m².				
	Context	On the road			
	Additional				
93463 (HER-SKA033) Zandputs kraal and farmstead	Type of feature	Stonewalling, Building		-31.223181, 21.013112	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: The farmstead is located next to the road. Upgrade of the road should not interfere with the farmstead. If any impact on the farmstead is expected, recorded in full by a historical architect is recommended to assess the full significance of the site. Mitigation Operational: None
	Material				
	N in m².				
	Context	55m from the road			
	Additional				
93477 (HER-SKA042) Vaalhoek/Bloem fontein Farmstead	Type of feature	Building		-31.140177, 21.015923	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: The farmstead is located next to the road. Upgrade of the road should not interfere with the farmstead. Mitigation Operational: None
	Material				
	N in m².				
	Context	Next to the road			
	Additional				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93485 (HER-SKA051) Rooisand house	Type of feature	Building		-30.679897, 21.320515	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: A conservation architect should draw up a management plan for its maintenance as part of the SKA properties
	Material				
	N in m².				
	Context	12m on a koppie			
	Additional				
46488 (KAT002) KAT_Prins 002	Type of feature	Cultural material		-30.751533, 21.432383	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid if possible, otherwise record site in detail before destruction. It is expected that avoidance will be possible given the distance between the site and the fibre optic route Mitigation Operational: None
	Material				
	N in m².				
	Context	180m from fibre optic cable route			
	Additional				
46489 (KAT003) KAT_Prins 003	Type of feature	Cultural material		-30.74475, 21.436467	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
46490 (KAT004) KAT_Prins 004	Type of feature	Stonewalling		-30.74445, 21.434683	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
46493 (WILLIS002) WILLISTON002	Type of feature	Cultural material		-30.71763, 21.32717	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
46494 (WILLIS003) WILLISTON003	Type of feature	Stonewalling		-30.71681, 21.32686	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
93790 (HER-SKA082)	Type of feature	Artefact Scatter		-30.808617, 21.12405	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible; the site has already been sufficiently recorded. Mitigation Operational: None
	Material				
	N in m².				
	Context	100m from existing road			
	Additional				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93792 (HER-SKA084)	Type of feature	Artefact Scatter		-30.268717, 22.218817	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
89921 (KAT_Morris_004.1) KAT004.1	Type of feature	Cultural material		-30.7438, 21.43306	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
93458 (HER-SKA057)	Type of feature	Stonewalling		-31.04665, 21.0614	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material				
	N in m².				
	Context	Near river			
	Additional	Shale stone kraal along river			
93460 (HER-SKA029)	Type of feature	Structures Farm boundary cairn		-31.04265, 21.0763	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None. Mitigation Operational: None
	Material				
	N in m².				
	Context	Open-air			
	Additional				
93453 (HER-SKA014)	Type of feature	Kraal and threshing floor		-30.800106, 21.381921	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material				
	N in m².				
	Context	On koppie			
	Additional	Artefacts, Ruin > 100 years, Stonewalling			
93474 (HER-SKA028)	Type of feature	Farm boundary cairn		-31.04354, 21.07745	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context	400m from satellite station			
	Additional				
93483 (HER-SKA050)	Type of feature	OES flask in the road		-30.70609, 21.37661	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context	2.7km from satellite station			
	Additional				
93492 (HER-SKA052)	Type of feature	Zoutrivier farmstead		-30.62023, 21.30582	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Material				
	N in m².				
	Context	1km from steel monopole			
	Additional				
93471 (HER-SKA026)	Type of feature	Friesland Suid Boundary marker		-31.00274, 21.07933	**Grade IIIc** Low local significance (SEA 2016)
	Material				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	N in m².				Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Context	The site is located 5m from the access road and 5m from the fibre cable route			
	Additional				
93504 (HER-SKA065)	Type of feature	Stone Kraal		**-30.684974, 22.020652**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material				
	N in m².				
	Context	5m from existing road			
	Additional				
46487 (KAT001) KAT_Prins 001	Type of feature	Artefacts		**-30.752267, 21.4298**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material				
	N in m².				
	Context				
	Additional				
93445 (HER-SKA010)	Type of feature	Stone dam wall		**-30.77814, 21.40346**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid during the upgrade of the road, same as 93478, the quiver tree forests growing around it Mitigation Operational: None
	Material	Stonewalling			
	N in m².				
	Context	115m from existing road			
	Additional				
93469 (HER-SKA049)	Type of feature	Stone realignment		**-30.72876, 21.3928**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material	Stonewalling			
	N in m².				
	Context	100m from MV power line			
	Additional				
93476 (HER-SKA047)	Type of feature	Ruin > 100 years, Artefacts		**-30.74644, 21.36809**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material	Farm ruins			
	N in m².				
	Context	26m from existing road			
	Additional				
93489 (HER-SKA038)	Type of feature	Dam wall		**-31.34694, 21.23085**	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible, the site has already been sufficiently recorded Mitigation Operational: None
	Material	Stonewalling			
	N in m².				
	Context	15m from the road			
	Additional				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93491 (HER-SKA039)	Type of feature	Rock fence line		-31.35844, 21.23903	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid - no impact is expected during the upgrade of the road Mitigation Operational: None
	Material				
	N in m².				
	Context	110m from the road			
	Additional				
93468 (HER-SKA036)	Type of feature	Rondavels		-31.325305, 20.981741	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Material				
	N in m².				
	Context	50m from the road			
	Additional				
93493 (HER-SKA037)	Type of feature	Walkraal farmstead		-31.328861, 21.073505	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid Mitigation Operational: None
	Material	Building, Stonewalling			
	N in m².				
	Context	150m from the road			
	Additional				
93511 (HER-SKA072)	Type of feature	Boulder enclosure		-30.755853, 21.394984	**Grade IIIc** Low local significance (SEA 2016) Mitigation Construction: Avoid, but if avoidance is not possible; the site has been sufficiently recorded Mitigation Operational: None
	Material				
	N in m².				
	Context	30m from fibre cable route			
	Additional				

Graves Identified

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
93456 (HER-SKA016)	Grave markers	Graveyard on Vissers Kloof	Historic	-30.81829, 21.38557	**Grade IIIa** High local significance Mitigation Construction: The site is already fenced off and established. If an upgrade of the road is necessary, the road should not expand any closer to the graveyard. Mitigation Operational: None
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent				
	Additional	3m from existing road			
93467 (HER-SKA027)	Grave markers	Friesland informal graveyard		-31.00777, 21.08155	**Grade IIIa** High local significance. Mitigation Construction : Avoid - if the road is to be upgraded, a fence must be erected around the cemetery for the project's construction phase. Relocation is the least preferred option. Mitigation Operational: None
	Inscription				
	Graves' Orientation	5m from existing road			
	Dimensions/ Extent				
	Additional	Burial Grounds and Graves, Building			

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
46495 (WILLIS004) WILLISTON004	Grave markers	Burial Grounds and Graves		**-30.6999, 21.33793**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent				
	Additional				
46496 (WILLIS005) WILLISTON005	Grave markers	Burial Grounds and Graves		**-30.70002, 21.3383**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent				
	Additional				
46498 (WILLIS007) WILLISTON007	Grave markers	Burial Grounds and Graves		**-30.70286, 21.33029**	**Grade IIIa** High local significance (SEA 2016) Mitigation Construction: None Mitigation Operational: None
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent				
	Additional				
BGG-001 (Digby Wells no GPS)	Grave markers	Burial Grounds and Graves		**No co-ordinates available**	**Grade 1** Very high significance A minimum buffer of 50 m must be established around known possible burial grounds and graves sites during the construction phase; the buffers must be demarcated, and signage placed during the construction period
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent	≤10 graves			
	Additional	500 m of the development footprint areas			
BGG-002 (Digby Wells no GPS)	Grave markers	Burial Grounds and Graves		**No co-ordinates available**	**Grade 1** Very high significance A minimum buffer of 50 m must be established around known possible burial grounds and graves sites during the construction phase; the buffers must be demarcated, and signage placed during the construction period
	Inscription				
	Graves' Orientation				
	Dimensions/ Extent	1 grave			
	Additional				

Intangible Heritage Resources/ Cultural Landscape Identified

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
89883	Nature	Abiquaputs (place mentioned in Bleek and Lloyd manuscripts)	Historic	**-30.365246, 20.786299**	**Grade II** Significant in the context of the province (SEA 2016)
	Cultural				

Site ID #	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
	evidence				Mitigation Required: none
	Access	On the road			
	Affected community	Khoesan.			
	Additional	Oral sources			
89885	Nature	Hartogskloof (place mentioned in Bleek and Lloyd manuscripts)	Historic	**-30.361937, 21.186933**	**Grade II** Significant in the context of the province (SEA 2016) Mitigation Required: none
	Cultural evidence				
	Access				
	Affected community				
	Additional				
89876	Nature	Groot Paardekloof (mentioned in Bleek and Lloyd manuscripts)	Historic	**-30.806733, 21.384888**	**Grade II** Significant in the context of the province (SEA 2016) Mitigation Required: none
	Cultural evidence				
	Access				
	Affected community				
	Additional				
93479 (HER-SKA034)	Nature	Monuments and Memorials		**-31.23742, 21.01144**	**Grade IIIb** Medium local significance (SEA 2016) Mitigation Construction: Avoid If this is not possible, relocation in the area, in consultation with the family, must be undertaken. Mitigation Operational: None
	Cultural evidence	Francois Esterhuizen memorial stone			
	Access	On the road			
	Affected community	Afrikaans local?			
	Additional				

Digby Wells – sites with undisclosed GPS locations.

Reference	Description	Cultural significance	Field Rating	Mitigations
SA-001	MSA open-air site consisting of a low-density surface scatter (<10:1 sq. m).	Low	**General Protection IV A**	It is recommended that a buffer of 50 m be established around known Stone Age occurrences with a low CS.
SA-002	Low-density surface scatter (<10:1 sq. m) associated with the Stone Age			
SA-004	Isolated surface finds including two lithics. One lithic has a patina, and the other appears younger (possibly LSA).	Negligible		Sufficiently recorded
SA-005	Low-density surface scatter (<10:1 sq. m) of what appear to be LSA lithics, including two bladelets.	Low		It is recommended that a buffer of 50 m be established around known Stone Age occurrences with a low CS. These sites were mapped and recorded
SA-006	Low-density surface scatter (<10:1 sq. m) of what appear to be LSA lithics, including two bladelets.			
SA-007	High-density surface scatter (>20:1 sq. m) representing the MSA and LSA			
SA-009	Stone Age low-density surface scatter (<10:1 sq. m)			
SA-010	Isolated surface finds of two LSA lithics, including one broken bladelet and one flake core.	Negligible		Sufficiently recorded
SA-012	MSA low density surface scatter (<10:1 sq. m)	Low	**General**	It is recommended that a buffer of 50 m be

SA-013	Low-density surface scatter (<10:1 sq. m) of Stone Age artefacts.		**Protection IV A**	established around known Stone Age occurrences with a low CS. SA-012, 014, 015 were recorded and mapped
SA-014	Site: low complexity, multiple components <25 sq. m / 5 x 5 m			
SA-015	Low-density surface scatter (10:1 sq. m) representing the ESA, MSA and LSA.			
SA-016 Swartfontein 496 Ptn RE/496	High-density surface scatters (>20:1 sq. m) of Stone Age artefacts, some of which may be LSA.	High	**Grade III B**	Phase 2 excavated
SA-017	Low-density LSA surface scatter (<10:1 sq. m).	Low	**General Protection IV A**	It is recommended that a buffer of 50 m be established around known Stone Age occurrences with a low CS.
SA-018	Isolated surface find of one lithic which may represent the MSA.	Negligible		Sufficiently recorded
SA-019	Low-density surface scatter (10:1 sq. m) representing the Middle Stone Age (MSA) and Later Stone Age (LSA).	Low		The identified heritage resources should be maintained in situ as far as is feasible. Digby Wells recommends that SARAO establish a buffer of 50 m around known Stone Age sites with a low CS value.
SA-020	Medium-density surface scatter (20:1 sq. m) representing the MSA and LSA.			
SA-021	Low-density lithic surface scatter (10:1 sq. m).			
SA-022	Low-density MSA and LSA surface scatter (10:1 sq. m).			
SA-023	Low-density MSA and LSA surface scatter (10:1 sq. m).			
HST-001	Isolated surface finds historical ammunition. A single Martini-Henry soft-shell cartridge that dates to the late 1890s and which were used by the Boers.	Negligible		Sufficiently recorded
HST-002	Historical structures as part of the Visserskloof Werf.	Low		Digby Wells recommends that the layout of the construction camp proposed at the Visskerskloof farmhouse be amended to avoid the historical components of the yard and incorporate a 25 m buffer around these components. The historical components of the yard must then be incorporated into the existing CMP. Should the redesign of the proposed construction camp layout not be feasible, SARAO must undertake a Section 34 Destruction Permit Application process in compliance with Section 34 of the NHRA and Chapter III of GN R 548. The identified heritage and associated adjacent structures must be recorded in detail in support of the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. The post-mitigation scenario assumes that the infrastructure layout design will be amended
MXD-001	Site: low complexity, multiple components <25 sq. m / 5 x 5 m			The identified sites must remain in situ and potential negative impacts removed through the following: A minimum buffer of 50 m must be
MXD-002	Site: high complexity, multiple components >2500 sq. m / 50 x 50 m	Medium	**Grade III B**	

MXD-003	Site: high complexity, multiple components >2500 sq. m / 50 x 50 m			established around known multi-layered sites during the construction phase; Infrastructures within the 50 m buffer must be considered for realignment (No antennas fall within proximity of known multi-layered sites). A Conservation Management Plan (CMP) for the SKA Project must be developed (This is currently within the scope of the HRM Process)
MXD-004	A Stone Age scatter adjacent to a historical farmhouse.	Low	**General Protection IV A**	Detailed recording of identified heritage and adjacent structures as part of a Section 34 Destruction Permit Application process should the historical structure not be avoided
RA-003 RA-004 RA-006 RA-007 RA-008	Rock art: engraving	Medium	**Grade IIIB**	The identified heritage resources must be maintained in situ. It is recommended that a minimum buffer of 50 m be established around all known Rock Art sites
RA-009 RA-010	Rock art: painting	Medium-High		
RA-011	Boulder that includes a geometric rock painting and an engraving of an animal.	High		
BHS 1 (SAHRIS ID: 93470)	Corbelled House associated with a historic farmstead located on De Hoek 70 RE	Medium-High	**Grade II**	The corbelled building and successive farmhouses are to be retained and enhanced. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined CS of the structures
BHS 2 (SAHRIS ID: 93473)	Farmstead Ruins located on Zout Rivier 71 Portion 2	Medium	**Grade IIIa**	Any proposed demolition of graded structures is subject to the requirements stipulated under Sections 27 & 34 of the NHRA and regulated by Chapter IV of GN R 548. It is recommended that the structures only be demolished to their existing floor level, i.e. removal of the walls and superstructure but keeping the building's footprint to prevent squatting and the need for maintenance. The graded structures and associated adjacent structures must be recorded in detail to support the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. Historic building materials were in existence and good condition (such as door and window frames or fireplaces), should be retained and made available for reuse for other historic structures in the area.
BHS 3 (SAHRIS ID: 46497)	Farmstead Building located on Rooi Zand 72 RE	Low	**Grade IIIa**	
BHS 4 (SAHRIS ID: 93485)	Farmstead Building located on Rooi Zand 72 Portion 1	Negligible	**Grade IIIb**	
BHS 5	Groot Paardekloof Farmstead	Medium-High	**Grade II**	These heritage resources should be considered a 'no-go' area. It is recommended that a 1km buffer around these resources be established and maintained throughout the Project life, within which no project-related activities may occur. The structures must be recorded in detail through photographs and
BHS 6	Groot Paardekloof School House	Low	**Grade IIIa**	

				measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined CS of the structures
BHS 7	Corbelled House and Farmstead located on Waterval 497 Portion 1	High	**Grade II**	The proposed access road must be rerouted outside the proposed 1km buffer to remove any negative impacts that may manifest. Furthermore, development in the valley to the north must be minimised.
BHS 8	Retaining Walls located on Klein Paardekoof	Medium-High	**Grade IIIb**	Adverse impacts to these structures should be avoided as far as possible, and a 50m buffer for III B resources established, respectively. It is recommended that these buffers be maintained throughout the Project life. The CS of the structures is informed from the placement in the landscape (site) and association with associated buildings (context). These must be retained. Mitigation measures against potential negative impacts on the resources and associated CS must be considered when avoiding the impacts themselves is not possible. It is recommended that these structures be recorded in detail through a photograph and measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined CS of the structures. Any proposed alterations of structures with a recommended III A and B grading are subject to the requirements stipulated under Section 34 of the NHRA and regulated by Chapter IV of GN R 548.

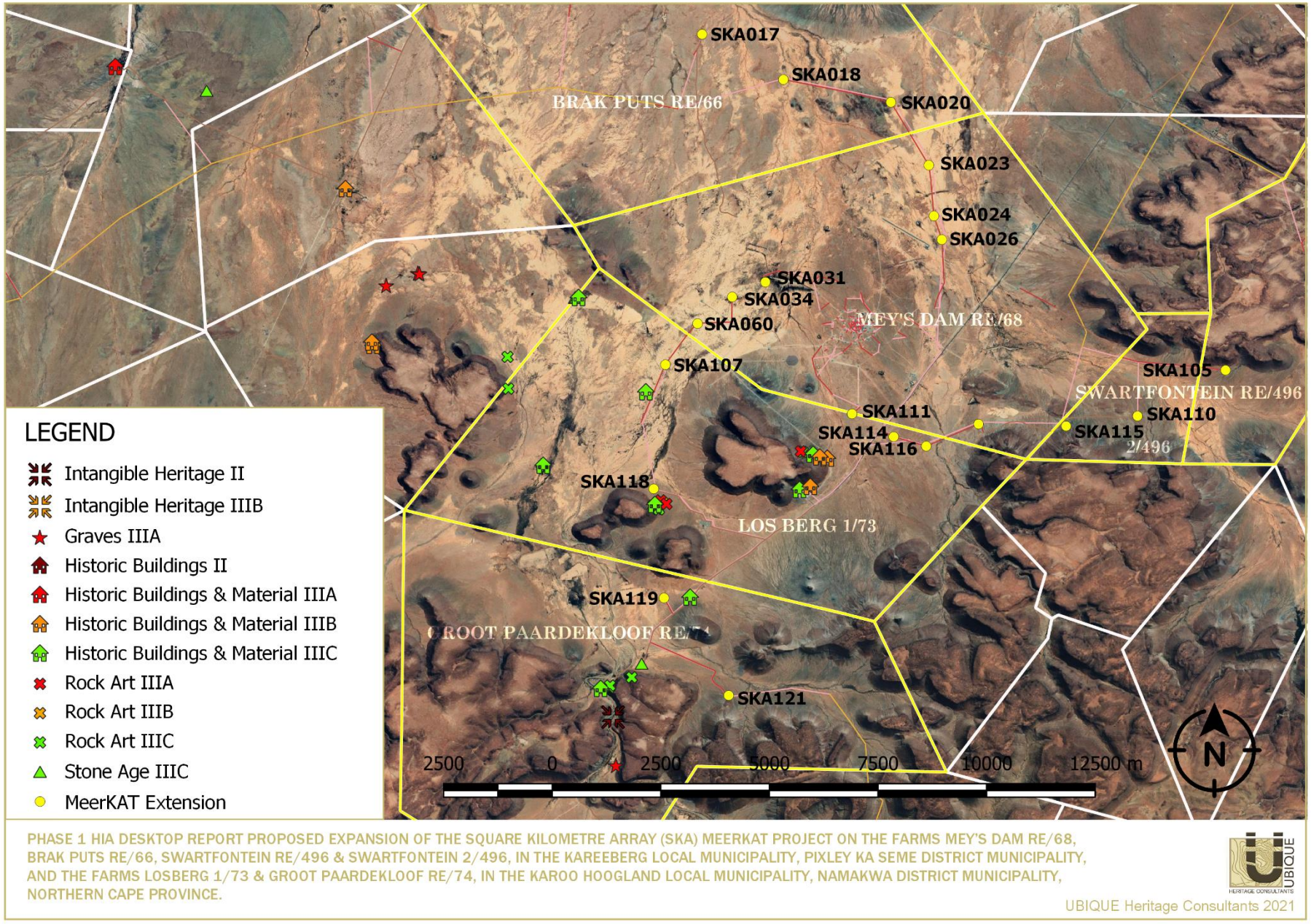

Figure 7 *The identified heritage resources across the SKA1_MID Project MeerKAT extension footprint, low significance (green), medium significance (orange) and high significance (red, dark red).*

6.3. Discussion

A total of 145 heritage resources were recorded through the SEA and HIA process. These include Stone age and rock art sites, graves, historic build environments and farmscapes, and intangible cultural heritage sites. The cultural significance rate from low to high for these identified resources. Thirty of these heritage resources were recorded on the farms affected by the SKA MeerKAT extension phase. The bulk of the documented heritage resources are on the Farms Los Berg 1/73 and Groot Paardekloof RE/74. The recorded heritage resources are close to SKA119, SKA118, SKA107, and in the vicinity of SKA114 and SKA116.

6.3.1. SKA119 Groot Paardekloof RE/74

To the west of SKA119, 115 m (-30.77814; 21.40346 from the existing road is a stonewalled dam (SiteID 93445) assigned a field rating of Grade IIIc, Low local significance (SEA 2016). The recommended mitigation for this site is to avoid during the construction phase, but during operation, the site should be unaffected. The site has a quiver tree forest growing around it which adds to its need for conservation. The site should have been sufficiently recorded during the HIA process.

6.3.2. SKA118 Los Berg 1/73

South of SKA118 is a stone and boulder enclosure (SiteID 93511). The feature is situated 30 m from the fibre cable route (-30.755853; 21.394984). The site has a grading of Grade IIIc and is of Low local significance (SEA 2016). The site was sufficiently recorded during the Phase 1 HIA if avoidance during construction is unavoidable. Four Grade III rock art sites are located close to SiteID 93511. In addition, the scratched rock engravings, SiteID 93515, SiteID 93514 SiteID 93513, and SiteID 93512, were adequately recorded during the HIA field survey if they can not be left in situ during the construction phase.

To the southeast of SKA118 is a Grade IIIb site, the De Hoek rock engraving 03 (SiteID 93451), approximately 100 m from the existing road (-30.75488; 21.39677). The rock art is of Medium local significance and should be avoided during construction. Two Grade IIIa, High local significance rock engravings, De Hoek rock engraving 01 (SiteID 93495) and De Hoek rock engraving 02 (SiteID 93475), are situated 140 m the fibre optic cabling and 140 m from the existing road. These sites should be avoided and protected with buffer zones.

6.3.3. SKA107 Los Berg 1/73

Approximately 0.89 km to the south of SKA107 is SiteID 93469, a stonewalled feature situated 100 m from the MV power line. The site is of Low local significance (Grade IIIc) and has been sufficiently documented if the site can not be avoided and left in situ during construction.

6.3.4. SKA114 & SKA116 Los Berg 1/73

At the foot of the butte to the southwest of SKA114 and SKA116 lies a cluster of heritage features. Two rock art features, SiteID 89920 (Grade IIIc) and SiteID 46491 (KAT_Prins 005), are some distance from any direct impact by the construction activities, and no mitigation other than avoidance is recommended.

A scatter of historical, cultural material was recorded at Site ID 89921 (Grade IIIc), and SiteID 46489 (Grade IIIb) and stonewalling at SiteID 46490 (Grade IIIb). Ranging from Low to Medium local significance, these sites do not need to be mitigated for the construction or operational phases of the project.

On the southern façade of the butte are two more historical artefact scatters in the vicinity of infrastructure. SiteID 46487 (Grade IIIc) has been sufficiently documented if impact should occur. However, SiteID 46488 (Grade IIIb) is of Medium local significance and should be avoided before destruction. As it lies 180 m from the fibre optic route, impact is improbable due to the distance from the construction and should be easy to avoid.

7. RECOMMENDATIONS

The HIA Desktop Report supports the findings and the recommendations made in the initial HIA reports submitted to SAHRIS CaseID 12292. Expressly, the Conservation Management Plans with Chance Finds Protocols compiled by Digby Wells Environmental (Hardwick et al. 2018, 2020) and accepted by SAHRA for the whole study area affected by the South African Radio Astronomy Observatory Square Kilometre Array Project.

For reference, see:

Hardwick, S, Van der Walt, J., du Piesanie, J. 2018a. The South African Radio Astronomy Observatory Square Kilometre Array Project: Heritage Impact Assessment. Digby Wells Environmental: Unpublished Report.

Hardwick, S, Du Piesanie, J, Van der Walt, J, Bamford, M, & Otto, D. 2018b. The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project: Chance Finds Protocol, Digby Wells Environmental: Unpublished Report.

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Hardwick, S, Van der Walt, J., du Piesanie, J. 2020a. The South African Radio Astronomy Observatory Square Kilometre Array Project: National Heritage Resources Act, 1999 (Act No. 25 of 1999) Section 35 Mitigations - Archaeological Mitigations Report, Digby Wells Environmental: Unpublished Report.

Hardwick, S, House, A, Du Piesanie, J, & Bamford, M. 2020b. The South African Radio Astronomy Observatory Square Kilometre Array Heritage Impact Assessment and Conservation Management Plan Project Heritage Impact Assessment Addendum, Digby Wells Environmental: Unpublished Report.

The following conclusions and general remarks apply:

According to Hardwick et al. (2018a):

1. A project-specific CMP including CFPs must be developed and implemented as part of this project that considers the project-specific activities concerning the itemised infrastructures. In addition, the CMP and CFPs must consider the sensitivity of the landscape in terms of palaeontology and archaeology.

2. Built Heritage resources with a recommended field rating of Grade II be formally declared and included in the national inventory. Recommended buffers around the structures intended for retention include a 1 km buffer for Grade II, retained Grade III A resources will require a 150 m buffer zone and retained Grade III B and III C resources require a 50 m buffer. These buffer zones must be implemented during the construction phase and operation phases.

3. Structures older than 60 years are afforded general protection and subject to permitting requirements stipulated under Sections 27 & 34 of the NHRA and regulated by Chapter IV of GN R 548. Individual permit applications must therefore be submitted for each protected building proposed for demolition. In addition, the affected structures must be recorded in detail, including photographs and measured drawing, before their alteration or destruction.

4. The development footprint must be rehabilitated as far as possible to reduce the intensity of the visual disturbance. This may include the following activities:
   - Limiting heights of any topsoil spoils that may be created
   - Trenched areas must be re-contoured
   - Borrow pits and quarries must be profiled to a natural topography
   - Disturbed areas must be revegetated with indigenous species following the requirements contained within the Ecological Assessment.
   - Dust suppression techniques should be employed as far as possible to limit dust pollution during construction activities.
   - Construction during the night must be avoided as far as possible. Where unavoidable, areas where these activities are taking place should be lit, and the number of lights and brightness must not exceed the minimum requirements for safety and security.
   - Downlighting and low-pressure lighting mediums such as sodium light sources must be implemented to minimise light pollution. In addition, lights should be directed towards the Project area and not outwards from the Project area.

According to Hardwick et al. (2020b; 2020a):

1. It is recommended that a buffer of 50 m be established around known Stone Age occurrences with a low cultural significance and General Protection IV A rating. These sites were mapped and recorded. The identified heritage resources should be maintained in situ as far as is feasible.

2. Digby Wells recommended that the layout of the construction camp proposed at the Visskerskloof farmhouse be amended to avoid the historical components of the yard and incorporate a 25 m buffer around these components. The historical components of the yard must then be incorporated into the existing CMP.

3. Should the redesign of the proposed construction camp layout not be feasible, SARAO must undertake a Section 34 Destruction Permit Application process in compliance with Section 34 of the NHRA and Chapter III of GN R 548. The identified heritage and associated adjacent structures must be recorded in detail in support of the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. The post-mitigation scenario assumes that the infrastructure layout design will be amended.

4. Rock Art Heritage with Grade IIIB ratings must be maintained in situ. It is recommended that a minimum buffer of 50 m be established around all known Rock Art sites.

5. It is recommended that the Grade II corbelled buildings and successive farmhouses are to be retained and enhanced. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined cultural significance of the structures.

6. Any proposed demolition of Grade IIIA graded structures is subject to the requirements stipulated under Sections 27 & 34 of the NHRA and regulated by Chapter IV of GN R 548. It is recommended that the structures only be demolished to their existing floor level, i.e. removal of the walls and superstructure but keeping the building's footprint to prevent squatting and the need for maintenance. The graded structures and associated adjacent structures must be recorded in detail to support the application for demolition and as a method of "preservation through record". Records should consist of photographs and measured drawings. Historic building materials were in existence and good condition

(such as door and window frames or fireplaces), should be retained and made available for reuse for other historic structures in the area.

7. Grade II heritage resources should be considered a 'no-go' area. It is recommended that a 1km buffer around these resources be established and maintained throughout the Project life, within which no project-related activities may occur. The structures must be recorded in detail through photographs and measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined cultural significance of the structures.

8. Adverse impacts to Grade IIIB structures should be avoided as far as possible, and a 50m buffer for IIIB resources established, respectively. It is recommended that these buffers be maintained throughout the Project life. The cultural significance of the structures is informed by their placement in the landscape (site) and association with associated buildings (context). These must be retained. Mitigation measures against potential negative impacts on the resources must be considered when avoiding the impacts themselves is not possible. It is recommended that these structures be recorded in detail through a photograph and measured drawings. No limitations are proposed on the types of use of the buildings, as long as the proposed new uses and functions are compatible with the defined CS of the structures. Any proposed alterations of structures with a recommended III A and B grading are subject to the requirements stipulated under Section 34 of the NHRA and regulated by Chapter IV of GN R 548.

9. A suitably qualified archaeologist must undertake a Watching Brief during earth-moving activities in proximity to identified heritage sites to record all material culture remains that may be exposed. The results of the Watching Brief must be compiled into a Watching Brief Report and submitted to SAHRA for noting.

10. Signage for in situ heritage resources demarcated by a no-go buffer zone between heritage resources and project activities must be established to indicate the presence of the resource. The heritage resources must be included in the existing CMP

Final Decision and Comments from SAHRIS CaseID 12292 (Higgitt 2020)

The following comments were made as a requirement in terms of section 38(4) of the NHRA and must be included in the existing Conservation Management Plan (CMP):

1. 38(4)a – The SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit has no objections to the proposed amendments to the development;

2. 38(4)b – The recommendations provided by the heritage specialists are supported and must be adhered to.

3. Additional further specific conditions are provided for the development as follows:

    - Watching Brief Reports must be submitted to the SAHRIS Case application upon completion of the construction phase;
    - The conditions provided in the Final Comment issued on 07/09/2018 are still valid (unless stated otherwise in this comment and specialist recommendations) and must be adhered to;
    - 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage

resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with the section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;

- 38(4)c(ii) – If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with the section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule;
- 38(4)d – See section 51(1) of the NHRA;
- 38(4)e – The following conditions apply with regards to the appointment of specialists:

  Suppose heritage resources are uncovered during the course of the development. In that case, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

8. CONCLUSION

This cultural heritage desktop assessment was conducted to determine the impact of the Square Kilometre Array/Karoo Array Telescope (SKA MeerKAT) extension on the Farms Mey's Dam Re/68, Brak Puts RE/66, Swartfontein RE/496 & Swartfontein 2/496, in the Kareeberg Local Municipality, Pixley Ka Seme District Municipality, and the Farms Los Berg 1/73 & Groot Paardekloof RE/74, in the Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. UBIQUE Heritage Consultants conclude that the initial HIAs and CMPs and Protocol of Finds completed from 2016-2020 are sufficient. If the recommendations and suggested mitigation and the management proposals are adhered to, there is no reason why the project can not continue.

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