

**SHELL INTERNATIONAL EXPLORATION AND
PRODUCTION B.V.**

**DRAFT Technical Report in support of the
EMP for the South Western Karoo Basin
Gas Exploration Application Project**

CULTURAL HERITAGE: EASTERN PRECINCT



ACTIVE HERITAGE cc.

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EXECUTIVE SUMMARY

Active Heritage cc has been appointed by Golder Associates Africa (Golder) on behalf of Shell Exploration Company B.V. (Shell), to undertake a desktop Heritage Scoping Level report, as part of the EMP process, of the proposed 30 000 square kilometre exploration area in the south western Karoo Basin referred to as the Eastern Precinct.

The main aim of this desktop study is to provide a synopsis of the heritage resources in the Eastern Precinct. This preliminary Heritage Assessment is based on a desktop survey of available literature and heritage databases. Only a few heritage surveys have been conducted in the Eastern Precinct and the available data is incomplete. Nevertheless, the available data indicate that heritage resources are varied and widely distributed in the study area. The majority of known heritage sites are rock art sites. These occur throughout the Eastern Precinct but are especially abundant in the northern and north-eastern section of the study area. Other heritage sites and features include stone age sites and tool scatters, historical buildings associated with villages and farmsteads, graveyards, and potential cultural landscapes.

Unfortunately, the exact co-ordinates of the majority of these sites are not given in the existing data bases and a site specific ground survey will be required in the areas earmarked for gas drilling and exploration.

ACRONYMS AND ABBREVIATIONS

ESA	Early Stone Age
HISTORIC PERIOD	Since the arrival of the white settlers - c. AD 1770 in this part of the country
IRON AGE	Early Iron Age AD 200 - AD 1000 Late Iron Age AD 1000 - AD 1830
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998) and associated regulations.
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999) and associated regulations (2000)
SAHRA	South African Heritage Resources Agency
STONE AGE	Early Stone Age 2 000 000 - 250 000 BP Middle Stone Age 250 000 - 25 000 BP Late Stone Age 30 000 - until c. AD 200

DEFINITIONS OF TERMINOLOGY

Archaeology: Remains resulting from human activities that are in a state of disuse and are in or on land which are older than 60 years, including artefacts, human and hominid remains, and artificial structures and features.

Early Stone Age: the archaeology of the Stone Age between 700 000 and 2500 000 years ago.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 25 of 1999).

Holocene: the most recent geological period that commenced approximately 10 000 years ago.

Late Stone Age: The archaeology of the last 20 000 – 30 000 years associated with fully modern people.

Middle Stone Age: The archaeology of the Stone Age between 20 000 and 300 000 years ago associated with early modern people.

Iron Age: The archaeology of the last 2000 years associated with Bantu-speaking agro-pastoralists.

National Estate: the collective heritage assets of the nation.

SAHRA: The South African Heritage Resources Agency – the compliance agency that protects national heritage.

Structure (historic): Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

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1.0 BRIEF OVERVIEW OF THE PROPOSED EXPLORATION APPLICATION PROJECT

Active Heritage cc has been appointed by Golder Associates Africa (Golder) on behalf of Shell Exploration Company B.V. (Shell), to undertake a desktop Heritage Scoping Level report, as part of the EMP process, of the proposed 30 000 square kilometre exploration area in the south western Karoo Basin referred to as the Eastern Precinct.

The precinct intersects the Eastern and Northern Cape Provinces, covering the Amatole, Cacadu and Chris Hani District Municipalities in the Eastern Cape, and the Pixley ka Seme District Municipality in the Northern Cape (Figure 1).

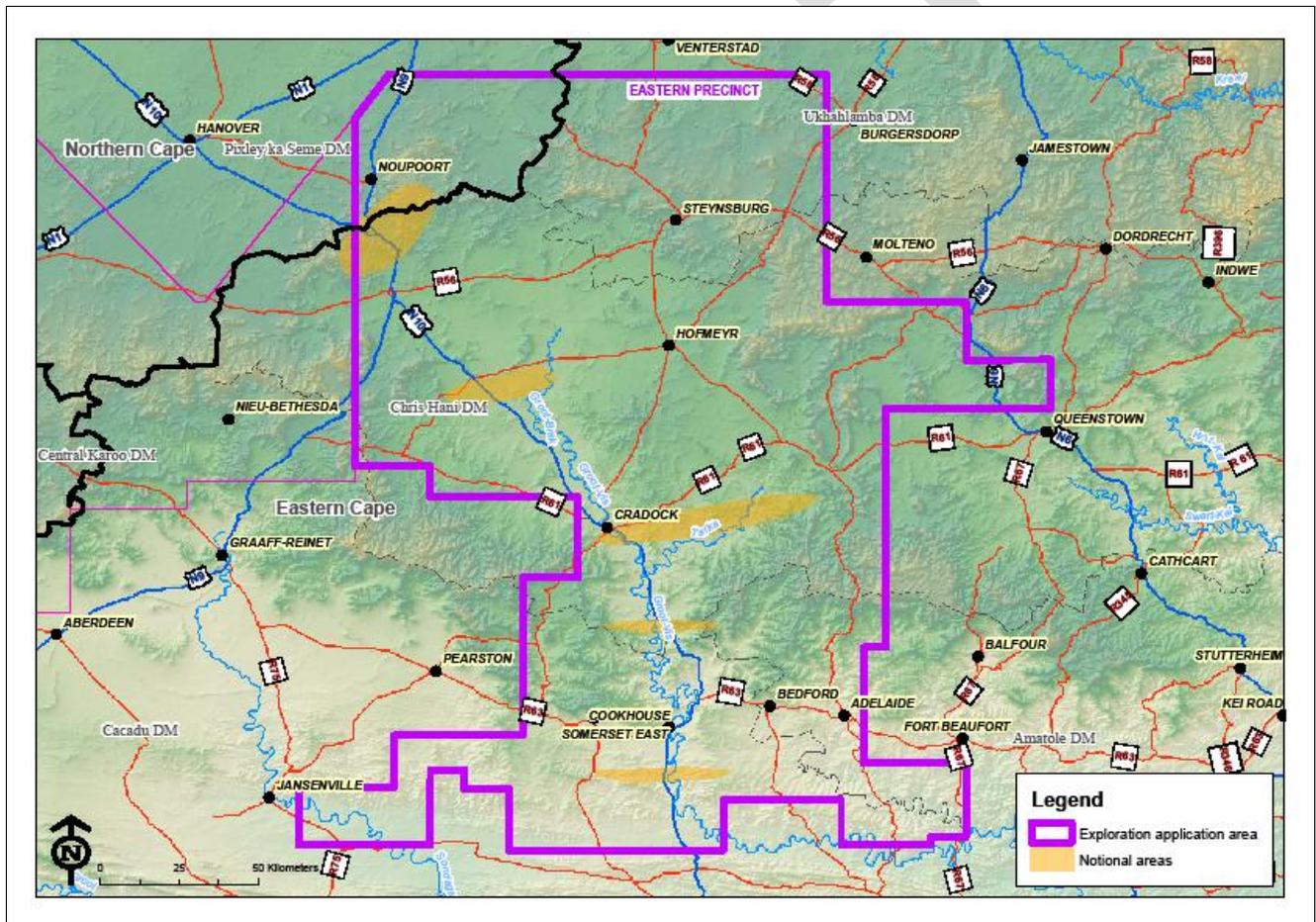


Figure 1: South Western Karoo, Eastern Precinct (purple line) and possible areas within which suitable well sites may be identified for future exploration drilling activities (orange polygons).

2.0 OBJECTIVES AND AIMS OF THIS STUDY

Active Heritage cc was subcontracted by Golder to undertake a desktop cultural heritage assessment for the South Western Karoo Basin, Eastern Precinct (Figure 1). This first phase of a cultural heritage assessment is required as a preliminary desktop exercise to identify potential heritage resources which may be impacted during site preparation, drilling and hydraulic fracturing, and decommissioning. The conclusions reached are entirely based on the available literature and the consultation of accessible heritage databases and registers. The project seeks to assess the value and significance of the known heritage resources found within the study area as well as ensure their protection and conservation. The view is promoted that development should take place in harmony with the sustainable use of heritage resources.

At this stage of the process, the heritage practitioner is required to provide:

- Description of the exploration application area in terms of cultural heritage; and
- Description of potential impacts of proposed exploration activities on heritage resources.

3.0 LEGISLATION

The National Heritage Resources Act 1999 (Act No. 25 of 1999) (NHRA) prescribes the manner in which heritage resources are assessed and managed. Section 3 (2) of this act defines South Africa's heritage resources to include:

- a. places, buildings, structures and equipment of cultural significance;*
- b. places to which oral traditions are attached or which are associated with living heritage;*
- c. historical settlements and townscapes;*
- d. landscapes and natural features of cultural significance;*
- e. geological sites of scientific or cultural importance;*
- f. archaeological and palaeontological sites;*
- g. graves and burial grounds, including-*
 - i. ancestral graves;*
 - ii. royal graves and graves of traditional leaders;*
 - iii. graves of victims of conflict;*
 - iv. graves of individuals designated by the Minister by notice in the Gazette;*
 - v. historical graves and cemeteries; and*
 - vi. other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);*
- h. sites of significance relating to the history of slavery in South Africa;*
- i. movable objects, including-*

- i. objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;*
- ii. objects to which oral traditions are attached or which are associated with living heritage;*
- iii. ethnographic art and objects;*
- iv. military objects;*
- v. objects of decorative or fine art;*
- vi. objects of scientific or technological interest; and*
- vii. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996)."*

The NHRA also stipulates in Section 3 (3) that a place or object is to be considered part of the national estate if it has cultural significance or other special value because of:

- "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."*

The NHRA also protects intangible heritage such as traditional activities, oral histories and places where significant events happened.

3.1 Relevant Authority

The relevant authority is the South African Heritage Resources Agency (SAHRA).

3.2 Significance rating / grading of heritage sites

Heritage resources are rated / graded in terms of significance. Heritage resources significance is determined through an assessment and grading criteria in terms of Section 7 of NHRA. In addition, in 2005, the SAHRA designed criteria (Table 1) to provide assistance and guidance for heritage resources rating and significance determination.

The SAHRA is responsible for heritage resources of national significance while the Provincial Heritage Resources Authorities are responsible for provincial heritage resources. It is important to note that the assessment of the significance of and rating of heritage resources depends on their state of conservation at the time of the assessment.

Table 1: Field rating and recommended grading of sites (SAHRA 2005)

Level	Details	Action
National (Grade I)	The site is considered to be of National Significance	Nominated to be declared by SAHRA
Provincial (Grade II)	This site is considered to be of Provincial significance	Nominated to be declared by Provincial Heritage Authority
Local Grade IIIA	This site is considered to be of HIGH significance locally	The site should be retained as a heritage site
Local Grade IIIB	This site is considered to be of HIGH significance locally	The site should be mitigated, and part retained as a heritage site
Generally Protected A	High to medium significance	Mitigation necessary before destruction
Generally Protected B	Medium significance	The site needs to be recorded before destruction
Generally Protected C	Low significance	No further recording is required before destruction

4.0 STUDY APPROACH / METHODOLOGY

This first phase heritage assessment is entirely based on a desktop study. No field surveys took place during this phase.

4.1 Desktop

3.1.1 Literature Survey

A survey of the literature pertinent to the region, including archaeological, anthropological and historical sources was conducted to assess the potential of heritage resources within the area. Past cultural heritage impact assessment survey reports conducted within the general project provided useful data as well. Unfortunately these only covered a few selected parts of the project area and many gaps remain.

3.1.2 Databases

The SAHRA web portal for gazetted sites, objects and shipwrecks was consulted. The Heritage Register List of SAHRA was also used to shed light about heritage resources present in the area. The archaeological databases of the Albany Museum in Grahamstown and National Museum, Bloemfontein provided some information relating to archaeological resources in the study area. The SARADA database of rock art in Africa was also consulted. The latter is housed at the Rock Art Research Institute at the University of the Witwatersrand.

4.2 Restrictions and assumptions

- The available databases are incomplete. Large areas of the study area have never been surveyed from a heritage perspective. The GPS coordinates are not available for all the listed sites.
- The study area has not been subject to a field survey. This is entirely a desktop based survey and no field or ground surveys were conducted. However, these will commence furthering the next phase of project.

5.0 STUDY RESULTS / BASELINE DESCRIPTION OF THE STUDY AREA

5.1 Desktop

4.1.1. Pre-colonial Archaeology

Large portions of the Eastern Cape Province have been thoroughly surveyed for heritage sites by the Archaeology Department of the Albany Museum in Grahamstown. Most of these areas occur to the south and southwest of the Eastern Precinct. However, smaller and sporadic surveys have

been conducted in Eastern Precinct area. Further north some extensive surveys have been conducted by Garth Sampson and his team in the Seacow River Valley – close to Middelburg.

The Early Stone Age

The earliest evidence for humanity in the Eastern Cape comes from a period known archaeologically as the Early Stone Age. The Early Stone Age sites of the Eastern Cape Province, including the Eastern Precinct, are for the most part open air scatters of stone tools with little other remains. A general problem when studying the Early Stone Age is that is usually only these tools which survive the immense periods of time. There are a few exceptions such as Wonderwerk Cave in the Northern Province, and Montagu Cave in the Southwestern Cape Province where bone and some plant material also survived (Mitchell 2007). However, archaeological sites with good deposits dating back to Early Stone Age times are scarce in the Eastern Cape. As a result our view of early Man in the project area is severely limited. Stone tools characteristic of the Early Stone Age have been found on the coastal belt around East London, in the Sundays River Valley closer to the coast, and Geelhoutboom and Amanzi Springs near Uitenhage to the immediate south of the project area. Johan Binneman, the archaeologist stationed at the Albany Museum, Grahamstown, reports that some Early Stone Age open air sites have been reported in the foothills of the Sneeuberge Mountains in the Eastern Precinct area. However, these are relatively scarce (Binneman pers com).

Amanzi Springs has been the only Early Stone Age site in the Eastern Cape systematically investigated by archaeologists. These springs obviously provided an attractive locality around which early man chose to camp. Sediment deposited by the springs sealed his artefacts within well defined layers. These artefacts are mostly large, bifacially flaked handaxes and cleavers shaped from locally available quartzite cobbles. Archaeologists agree that these tools were probably used in the hand and were not mounted on shafts in any way. They were most probably used to remove meat from and prepare hides from the carcasses they had either hunted themselves or scavenged from other predators. Although plant material is not preserved, bulbs, roots and berries probably provided the bulk of their food. It is not possible to measure directly the age of the Early Stone Age in the Eastern Cape but comparison between dated sites in Gauteng, and the Northern Cape Provinces as well as Eastern Africa suggests that these sites fall somewhere between 200 000 and 1 million years ago. Little technological change is evident during this long period of time. No human remains have been found in the Eastern Cape which would indicate who the makers of the Early Stone Age tools were. Again evidence from elsewhere in Africa, such as at the Cradle of Humankind near Krugersdorp, suggests that they were an upright walking people called *Homo erectus* and *Homo ergaster*. Present archaeological understanding is that an early dispersal of

Homo erectus out of Africa, around 2 million years ago, led to parts of Eurasia being populated by this hominin. In Western Europe *Homo erectus* eventually developed into *Homo neanderthalensis* whereas this species developed directly into early forms of *Homo sapiens* in Africa.

The Middle Stone Age

These archaic *Homo sapiens* eventually developed into *Homo sapiens sapiens* (or anatomically modern people) somewhere in eastern or Southern Africa. In fact, southern Africa boast some of the earliest evidence in the world for the presence of early *Homo sapiens sapiens* and for early symbolic behaviour and the development of human cognition (Mitchell 2007). The archaeological site industry associated with early *Homo sapiens sapiens* is called the Middle Stone Age. The start of the Middle Stone Age around 200 000 years ago was marked by technological advances relative to the Early Stone Age. Middle Stone Age Tools are smaller and more refined. Whereas Early Stone Age hand axes were shaped by removing flakes, Middle Stone Age tools were made from flakes and the larger stones or cores from which they were struck were discarded. These flakes are often finely pointed and recent research has indicated that some were mounted on wooden or bone hafts in order to make spears, arrows, and knives. The raw material for these tools was mostly quartzite, except for a brief time around 94 000 years ago, when finer grained silcretes were used to manufacture a wider range of tools. A small cave in Howison's Poort near Grahamstown, to the immediate south of the Eastern Precinct, contained material from this period.

A very important site from the Middle Stone Age period is located near Hofmeyer in the Eastern Precinct. Here a human skull was found in a donga that dates back to the period ca. 39 000 years ago. This is one of the very few sites containing human skeletal remains that belong to this period in southern Africa. Interestingly, the morphological features of this individual compares very well with those of early *Homo sapiens sapiens* for this period in western Europe and it supports the hypothesis that all anatomically modern people originated from Africa from where they populated the rest of the world around 40 000 years ago (the so-called "out of Africa hypothesis") (Morris 2008).

An important feature during the later time periods of the Middle Stone Age , from about 80 000 years ago was the fluctuating but progressive drop in world temperatures. As the ice caps expanded the sea levels dropped and retreated. These cooler conditions would also have brought about changes in the more inland areas such as the project area. During the initial stages of the Middle Stone Age the vegetation would have been similar than today. However, as temperatures dropped the vegetation became more open with large areas been given to grassland. Grazing animals came to dominate the diets of the people located inland from the coastal zones.

The Later Stone Age

It was during the Later Stone Age that the full range of material culture which can be readily identified with that made by the Bushmen or San of the historical period, developed. Although skeletal material belonging to the period between 40 000 years and 20 000 years ago are very scarce in South Africa human skulls dated from about 15 000 years ago onwards clearly suggests a Khoisan affinity to the makers of later Stone Age tools.

More than 200 Later Stone Age sites are known from the Eastern Cape Province and many more are awaiting discovery. The majority of the known sites have been recorded in the coastal areas, the greater Grahamstown area and the Baviaans kloof by archaeologists from the Albany Museum, Grahamstown. Various caves and rock shelters containing Later Stone Age deposit have been located in the Suurberg and Winterhoekberg extension of the Cape folded mountains around Grahamstown, Alicedale and Uitenhage (Hall 1988). Open air Later Stone Age tool scatters does occur in the Seacow River Valley in the close vicinity of Middelburg in the Eastern Precinct. This area has been systematically surveyed by professor Garth Sampson and his team over a period of thirty years. The vast majority of the 16 000 Stone Age sites located here are open air sites. However, Garth Sampson also located a handful of rock shelters that were excavated (1985). These include Driekoppen, Volstruisfontein, Lame Sheep, Leeuhoek, Abbot's Cave, Van Zyl Rus, and Boundary shelter (Close & Sampson 1998). The Seacow River has its origins in the Sneeuberg Mountains and it is entirely possible that future and more systematic surveys in the project area will uncover many more such sites. Earlier excavated sites in the Upper Karoo include Highland Rock Shelter and Tafelberg Hall near Cradock. Further south the most thoroughly investigated Later Stone Age rock shelter sites in the Eastern Precinct are the sites of Edgehill and Welgeluk. These sites are situated near Fort Beaufort to the immediate north of the Cape folded mountains. Further north the sites of Fairview and Waterval, situated in the Winterberg, have also been excavated by archaeologists (Hall & Binneman 1985). All the above mentioned sites were inhabited by the San - some as late as the final years of the 19th century.

Although Khoekhoen pastoralist groups certainly lived in parts of the Eastern Precinct during the past none of their sites, with the exception of a few in the Seacow River Valley and adjacent areas (Sadr & Sampson 1999), has been systematically recorded by archaeologists. In fact, most archaeological research on the Khoekhoen are focussed on the coastal areas of the Eastern Cape region.

Rock Art

The Central Precinct is unique in South Africa in that San rock art here consists of both paintings as well as engravings. The survey of rock art sites by Sampson (1985) the northern section of the Eastern Precinct has shown that the painting/engraving distribution boundary line is not as clear-cut as that proposed by Van Riet Lowe (1941), but in general more engravings are found in the central valleys with its dolerite koppies while the more mountainous upper valleys has more paintings. South of Cradock most rock art sites consist of paintings only. Both Fairview and Waterval contains interesting rock painting panels. Interestingly, John Barrow visited Waterval in 1797 in search of a legendary San painting said to depict a unicorn (Hall & Binneman 1985). Disappointed in his quest he did however record his admiration for the paintings which blanket almost the entire wall of the site. The SARADA data base of rock art indicate at least five rock painting sites near Somerset-East, six sites near Bedford, and eleven sites near Fort Beaufort in the southern section of the Eastern Precinct. Further north the percentage of sites increase dramatically. One hundred and fifty two sites are known in the greater Middelburg area (the area intensively surveyed by Garth Sampson and his team), twelve sites in near Cradock (including the Bergkwagga National Park), thirty six sites in the greater Tarka region, three sites near Hofmeyer, twenty one sites near Steynsburg, and almost fifty sites in the greater Queenstown area – although not all these sites occur within the Eastern Precinct (Van Riet Lowe 1941).

The vast majority of rock paintings in the Eastern Precinct are attributed to the Later Stone Age period or to the San hunter-gatherers and their immediate predecessors. Nevertheless schematic finger paintings do occur near Queenstown (Derricourt 1971) and these may be attributed to Khoekhoen pastoralists rather than San. Today researchers agree that most of the San art depicts the religious world of the San. The art is highly symbolic rather than narrative and contains metaphors relating to the spirit-world as experienced by San medicine people or shamans.

Colonial Archaeology

The Eastern Cape region, including the Eastern Precinct, are typically viewed by historians as a frontier zone. This area was the meeting place between an aggressively expanding colonial frontier and the southern most distribution of black Bantu-speaking farming communities in Africa (Huffman 2007). It is well known in the historical literature for the nine frontier wars that were fought here between the settlers of the Cape colony and the Xhosa nation between 1779 and 1879. Whereas white colonial settlement expanded north and eastwards from Table Bay, in modern Cape Town, some 350 years ago Bantu-speaking agropastoralists, the predecessors of the Xhosa nation, inhabited areas to the east of the Sundays river already since 1300 years ago (Binneman et al 1992). For many centuries their movement further west and south were hindered by a climatic frontier that prevented these small-scale subsistence farmers from cultivating summer-rainfall crops, such as millet and sorghum, their main source of food. In the present

climatic regime the environs of the Sundays River, that runs through the south western section of the Eastern Precinct, demarcates the boundary between the summer-rainfall and all seasonal rainfall areas of the Eastern Cape Province. Further inland the lush grasslands of the coastal zone gives way to the low rainfall and semi-arid conditions of the Karoo as is evident in the area to the immediate north of Somerset-East going towards Noupoort and Steynsburg. Again these semi-arid areas would have been unsuitable for permanent agropastoralist settlement. Nevertheless, it is known from historical sources that Xhosa people from the east often grazed their cattle in these areas. Adding to the climatic constraints, the first Bantu-speaking pioneers also encountered other indigenous population groups in these more marginal areas as did colonial agents many centuries later. These were the Khoisan - the direct descendants of the first modern people to have emerged in Africa some 200 000 years ago. These people had from the time of van Riebeeck become popularly known as the San or Bushmen and Khoekhoen or Hottentots. Whereas the Khoekhoen typically lived closer to the coastal areas where they could find adequate grazing for their cattle and sheep the San hunter-gatherers lived further inland in areas not favoured by either Khoekhoen pastoralists or Bantu-speaking agropastoralists. Nevertheless, the Eastern Cape became the contact zone between these different cultures both in the historical and prehistoric past. In their diaries early European travellers to the Eastern Cape, including the Central Precinct area, observed and recorded San and Khoekhoen habits and customs but before detailed accounts could be made these the social and political structures of the eastern Cape San and Khoekhoen were obliterated by the effects of colonial expansion.

During the late 18th and 19th centuries the area bordering onto the eastern and southern borders of the Eastern Precinct became a contested zone between various Xhosa-policies and the expanding colonial frontier. Nine frontier wars were fought between 1779 and 1878 which saw numerous forts and structures belonging to this period being constructed to the south and east of the Eastern Precinct. The Eastern Precinct area, however, was firmly placed in the hands of white colonists and although it also felt the effects of the frontier wars it was not placed directly within the conflict zone. The first farms in the area were already granted in the late 18th century. It was also an area that saw Dutch resistance against British imperialism with many farmers from this area joining their compatriots in the "Great Trek" movement of 1834 (Hummel 1988).

From the above it can be predicted that there may be a number of old graveyards and historic buildings belonging to the early eastern frontier period on various farms in the Eastern Precinct. However, none of these have been properly assessed. A glance at the SAHRA inventory of provincial heritage sites indicate the following heritage sites of significance in the Eastern Precinct:

- Five provincial heritage sites is listed for the greater Middelburg area. Most of these are historical buildings dating to the 19th century.

- Eight provincial heritage sites are listed for the greater Cradock area. These include historical homesteads and the scarophagus and home of the well-known writer Olive Schreiner. A memorial dedicated to the Cradock four has also been erected in the town. The Cradock Four relates to the very recent struggle history of South Africa when four activists were brutally murdered by the South African Police service of the then Apartheid Government. This memorial will most probably receive National Heritage status.
- Fourteen historical buildings are rated as provincial heritage sites in Somerset-East. One of these includes the Walter Battis Museum.
- Five historical buildings as rated at provincial heritage sites in Bedford. Three of these are church buildings.
- Two historical buildings in Adelaide have been awarded provincial heritage status. One is a church building and the other is a museum.
- The old magistrate court at Hofmeyer is rated as a provincial heritage site.
- Bulhoek farm, Steynsburg is regarded as the birthplace of President Paul Kruger and has been rated as a Provincial Heritage site (Oberholster 1972).

4.1.3. Cultural landscapes and sense of place

As no field surveys have been undertaken and descriptions of the receiving environment is based on published material and aerial maps it is difficult to establish whether specific areas could be described as cultural landscapes. Nevertheless, the landscape of the Eastern Precinct can be described as a remote arid landscape and its visual qualities linked to the undulating topography and undisturbed nature of the landscape. The only intrusions are existing transmission lines, scattered homesteads, wind pumps, and access roads. These contribute to the rural landscape. "There is a perceived sense of absence of human intervention or intrusion" (Patrick et al. 2009) especially in the northern sections of the study area, the vast empty expanses exemplifying the qualities of the Karoo.

4.1.4 Discussion

A number of archaeological surveys and investigations have been undertaken in the Eastern Precinct. However, this literature survey which is based on desktop research is incomplete and needs to be supplemented by ground surveys (subsequent to site selection) in order to provide a more comprehensive picture of heritage sites and features on the landscape. Based on the available heritage data it is possible to indicate broad patterns that may assist the site selection team in avoiding heritage sites and the potential damage thereof. These are provided in Section 8.1 below.

6.0 TECHNIAL ASSESSMENT

6.1 Exploration activities that could potentially impact the environment¹

Cultural heritage includes both tangible and intangible aspects. The tangible aspects of heritage such as archaeological sites, historical buildings, and to some extent cultural landscapes are for the most part non-renewable. Unlike natural resources tangible, cultural heritage cannot be renewed once damaged or destroyed. Land rehabilitation measures will have no effect on tangible cultural heritage once altered or destroyed. Exploration related activities which could potentially damage heritage sites or structures are outlined below.

Well site preparation

- Construction of access roads and preparation of the well site could damage heritage sites and features in the immediate environs of the well site. The generation of dust could pose a threat to rock paintings in close proximity to the site.
- Transportation of exploration equipment / vehicle movement outside of existing roads. Large areas of the Karoo are flat and it would be relatively easy to drive with a high clearance vehicle over these parts. However, stone tools scatters and other heritage features may occur in these flat areas and will be at risk, if the transportation is not limited to roads.

Exploration drilling and hydraulic fracturing

- Drilling and hydraulic fracturing could damage heritage sites and features in the near environs of the well site. Excessive dust created by drilling activities could also damage certain heritage sites such as rock paintings.
- Explorative drilling may unearth heritage material not located during the heritage ground survey. Should any heritage site or artefacts be unearthed then all activities should stop immediately and the local heritage agencies (i.e. Western Cape Heritage and SAHRA) be contacted for further evaluation. It is recommended that a heritage awareness guide be provided to the well site preparation personnel and drilling crew to help them identify heritage resources, should they be unearthed during activities.

¹ It is assumed that geophysical data acquisition (e.g. Magneto-Telluric Surveys) will have negligible impacts on cultural heritage aspects and thus has been excluded from this assessment.

Decommissioning

- It is unlikely that decommissioning should have any potentially negative impact on heritage sites and features not previously addressed. However, land rehabilitation processes may have a negative impact on heritage sites in the immediate environs of the rehabilitation site.

6.2 Description of the technical assessment methodology

Potential significance of impacts was based on occurrence and severity, which are further subdivided as follows:

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Magnitude (severity) of impact	Scale / extent of impact

To assess each impact, the following four ranking scales are used:

PROBABILITY	DURATION
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term
3 - Medium probability	3 - Medium-term (8-15 years)
2 - Low probability	2 - Short-term (0-7 years) (impact ceases after the operational life of the activity)
1 - Improbable	1 - Immediate
0 - None	
SCALE	MAGNITUDE
5 - International	10 - Very high/don't know
4 - National	8 - High
3 - Regional	6 - Moderate
2 - Local	4 - Low
1 - Site only	2 - Minor
0 - None	

The significance of the two aspects, occurrence and severity, is assessed using the following formula:

SP (significance points) = (probability + duration + scale) x magnitude

The maximum value is 150 significance points (SP). The impact significance will then be rated as follows:

SP >75	Indicates high environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 75	Indicates moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP <30	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.
+	Positive impact	An impact that is likely to result in positive consequences/effects.

6.3 Assessment

Table 2 below summarises those impacts directly related to the proposed exploration project, and provides a significance rating for each impact before and after mitigation.

Table 2: Technical Assessment Matrix for the proposed South Western Karoo Basin Gas Exploration Application Project

POTENTIAL ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE											
	Before mitigation						After mitigation					
	M	D	S	P	Total	SP	M	D	S	P	Total	SP
<i>Cultural Heritage</i>												
Construction of access roads and preparation of the well site could damage heritage sites and features in the immediate environs of the well site. The generation of dust could pose a threat to rock paintings in close proximity to the site.	6	5	2	3	60	Mod	2	5	2	1	16	Low

Construction of access roads and the well site could damage heritage sites and features in the immediate environs of the proposed well site.

Impacts of moderate significance are expected if the proposed access road is situated within the immediate environs of a heritage site (i.e. within 20 m), if the proposed well site is located within

50 m from a heritage site, and the proposed well site and/or access road are located within 100 m of rock art sites.

Should the following mitigation measures be implemented prior to site preparation and construction, impact significance will be reduced to low:

- During well site selection, no sites should be placed within 100 m of declared national and provincial heritage sites.
- Once the preliminary sites are selected, a site specific cultural heritage impact assessment will need to be conducted to identify any heritage sites and features. Based on the findings of the assessment:
 - No access roads should be constructed within 20 m of identified heritage sites and features which are rated as sites of high local significance by the South African Heritage Resources Agency (SAHRA) (see Table 1 above);
 - No well sites should be constructed within 50 m of heritage sites and features which are rated as sites of high local significance by the SAHRA; and
 - No well sites or access roads should be constructed within 100 m of rock art sites which are rated as sites of high local significance by the SAHRA.

The site specific cultural heritage impact assessment will therefore inform final site selection.

Note: the SAHRA usually allows for development to commence where heritage sites or features are rated as sites of low significance (i.e. are not of any regional or local importance and/or are duplicated in many areas).

Should heritage sites rated as sites of medium to high significance be located within the above-mentioned buffer zones in relation to the selected well sites, appropriate mitigation measures will need to be implemented, in consultation with the relevant heritage agency. Mitigation could entail rescue excavation, once a permit is granted by the SAHRA.

Should any archaeological or heritage features artefacts be uncovered during exploration, all activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) approached in order to determine appropriate mitigation measures for the discovered finds, if necessary. Mitigation of heritage sites will be called for when they are rated as of medium to high significance. Mitigation could entail rescue excavation of relevant heritage sites - once a permit is granted for excavation by the SAHRA. If the relevant heritage sites include graves then the protocol provided in Section 36 of the National

Heritage Resources Act, 1999 (Act 25 of 1999), regarding grave exhumation, will be followed (see APPENDIX 1).

It is recommended that a heritage awareness guide be provided to the well site preparation personnel and drilling crew to help them identify heritage resources, should they be unearthed as a result of the exploration related activities.

6.4 Assumptions and knowledge gaps / limitations

- It is assumed that the vibrations caused by the proposed drilling will not have a negative impact on sites situated more than 100 m from the 1 hectare well sites.
- It is assumed that the dust caused by the proposed drilling will not have a negative impact on rock painting sites situated more than 100 m from the 1 hectare well sites.

7.0 MITIGATION AND MANAGEMENT MEASURES

The following mitigation measures have been identified for the proposed project (Table 3).

Table 3: Environmental Management Plan for proposed South Western Karoo Basin Gas Exploration Application Project

Environmental Management Plan		Timeline and frequency	Responsible party	
<i>1. Cultural Heritage</i>				
1.1	Project activity:	Construction of access roads and well site preparation.	-	
	Impact:	Damage to heritage sites and features in the immediate environs of the site.	-	
	Mitigation measure(s):	During well site selection, no sites should be placed within 100 m of declared national and provincial heritage sites.	Site selection	Site selection team
		A site specific heritage impact assessment will need to be conducted to identify any heritage sites and features.	As appropriate, before construction of access roads and well site preparation	Heritage practitioner
		<ul style="list-style-type: none"> • Areas identified for access road construction should be surveyed for heritage sites on the ground. • The one hectare well sites must be thoroughly surveyed (i.e. ground survey) for any heritage sites or features. 		
Mitigation measure(s):	Based on the findings of the assessment: <ul style="list-style-type: none"> • No access roads should be constructed within 20 m of identified heritage sites and features which are rated as sites of high local significance by the South African Heritage Resources Agency (SAHRA) (see Table 1); • No well sites should be constructed within 50 m of heritage sites and features which are rated as sites of high local significance by the SAHRA; and • No well sites or access roads should be constructed within 100 m of rock art sites which are rated as sites of high local significance by the SAHRA. 	As appropriate, to be determined prior to well site preparation and road construction and implemented throughout exploration	Drilling Contractor / SHEC	
Mitigation measure(s):	Should heritage sites rated as sites of medium to high significance be located within the above-mentioned buffer zones in relation to the selected well sites, appropriate mitigation measures will need to be implemented, in consultation with the relevant heritage agency. Mitigation could entail rescue excavation, once a permit is granted	As appropriate, before construction of access roads and well site preparation	Heritage practitioner	

Environmental Management Plan		Timeline and frequency	Responsible party
	by the SAHRA.		
	Should any archaeological or heritage features artefacts be uncovered during exploration, all activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) approached in order to determine appropriate mitigation measures for the discovered finds, if necessary. Mitigation of heritage sites will be called for when they are rated as of medium to high significance. Mitigation could entail rescue excavation of relevant heritage sites - once a permit is granted for excavation by the SAHRA. If the relevant heritage sites include graves then the protocol provided in Section 36 of the National Heritage Resources Act, 1999 (Act 25 of 1999), regarding grave exhumation, will be followed.	If necessary, throughout exploration	Drilling Contractor / SHEC
	It is recommended that a heritage awareness guide be provided to the well site preparation personnel and drilling crew to help them identify heritage resources, should they be unearthed as a result of the exploration related activities.	As appropriate, prior to access road construction, well site preparation, drilling	SHEC

7.1 Recommended monitoring programmes

Sites situated closer than 200 m from the well sites and rated as significant and fragile should be monitored on a monthly basis until such time that exploration activities cease.

8.0 RECOMMENDATIONS FOR THE DETAILED IMPACT ASSESSMENT

Following the submission of the EMP, and a site selection process for the well sites, a detailed environmental impact assessment (EIA) will be undertaken.

8.1 Recommended site selection criteria

The following areas need to be avoided during site selection:

- Declared national and provincial heritage sites. Over thirty Provincial Heritage sites occur in the Eastern Precinct.

Prior to final site selection, a ground survey should be conducted. The following areas may contain heritage sites and should be considered during the undertaking of the ground survey:

- Rock shelters in the river valleys bisecting the mountain ranges will contain rock paintings and archaeological deposit. Areas with sandstone outcrops especially in the environs of Queenstown, Steynsburg, and Middelburg will contain shelters with archaeological material.
- Dolerite outcrops and boulders may contain rock engravings. Karoo koppies consisting of dolerite boulders are promising candidates in this regard (Parkington et al 2008). The western areas of the Eastern Precinct, especially around Middelburg, will contain rock engravings.
- It is also likely that ground surveys may uncover scatters of Early, Middle and Later Stone age artefacts near fountains and water courses.
- Stone walling, including stone walled enclosures, related to Khoekhoen pastoralist activities may also be found in various localities where grazing would have been available in the past.
- Old farmsteads, older than 60 years and hence of heritage significance, will occur on most farms in the area. We may anticipate that these may consist of farmhouses, sheds, outbuildings, kraals and other structures.
- Unconfirmed reports indicate the possible presence of block houses between Noupoort and Steynsburg and in the greater Fish River Basin near Cradock.
- Various historical buildings, most of which date to the 19th century and subsequent periods, occur in the small towns in the area.

- Graves belonging to both the indigenous peoples as well as colonial graveyards will occur on various farms and small towns in the area.

8.2 Key questions to be addressed in the EIA

The following key questions will need to be addressed in the EIA:

- Are there any heritage resources or features located within or nearby (i.e. within 200 m) selected well sites and new access road alignments?
- If so, what is the significance of the heritage resource or feature (according to SAHRA rating and grading of sites)?
- Should heritage resources or features be rated as medium or high significance, what mitigation measures need to be implemented?

9.0 CONCLUSION

This preliminary Heritage Assessment is based on a desktop survey of available literature and heritage databases. Only a few heritage surveys have been conducted in the Eastern Precinct and the available data is incomplete. Nevertheless, the available data indicates that heritage resources are varied and widely distributed in the study area. The majority of known heritage sites are rock art sites. These occur throughout the Eastern Precinct but are especially abundant in the northern and north-eastern section of the study area. Other heritage sites and features include stone age sites and tool scatters, historical buildings associated with villages and farmsteads, graveyards, and potential cultural landscapes.

Unfortunately the exact coordinates of the majority of these sites are not given in the existing data bases and a site specific ground survey will be required in the areas earmarked for gas drilling and exploration.

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APPENDIX 1 RELOCATION OF GRAVES

Burial grounds and graves are dealt with in Article 36 of the NHR Act, no 25 of 1999. Below follows a broad summary of how to deal with grave in the event of proposed development.

- § If the graves are younger than 60 years, an undertaker can be contracted to deal with the exhumation and reburial. This will include public participation, organising cemeteries, coffins, etc. They need permits and have their own requirements that must be adhered to.
- § If the graves are older than 60 years old or of undetermined age, an archaeologist must be in attendance to assist with the exhumation and documentation of the graves. This is a requirement by law.

Once it has been decided to relocate particular graves, the following steps should be taken:

- § Notices of the intention to relocate the graves need to be put up at the burial site for a period of 60 days. This should contain information where communities and family members can contact the developer/archaeologist/public-relations officer/undertaker. All information pertaining to the identification of the graves needs to be documented for the application of a SAHRA permit. The notices need to be in at least 3 languages, English, and two other languages. This is a requirement by law.
- § Notices of the intention needs to be placed in at least two local newspapers and have the same information as the above point. This is a requirement by law.
- § Local radio stations can also be used to try contact family members. This is not required by law, but is helpful in trying to contact family members.
- § During this time (60 days) a suitable cemetery need to be identified close to the development area or otherwise one specified by the family of the deceased.
- § An open day for family members should be arranged after the period of 60 days so that they can gather to discuss the way forward, and to sort out any problems. The developer needs to take the families requirements into account. This is a requirement by law.
- § Once the 60 days has passed and all the information from the family members have been received, a permit can be requested from SAHRA. This is a requirement by law.
- § Once the permit has been received, the graves may be exhumed and relocated.
- § All headstones must be relocated with the graves as well as any items found in the grave

