ESKOM HOLDINGS LIMITED
GENERATION DIVISION

NUCLEAR 1 ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

SPECIALIST STUDY FOR SCOPING REPORT

SPECIALIST STUDY: HERITAGE

J27035

AUGUST 2007

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CONTENTS

1 EXECUTIVE SUMMARY

The Archaeology Contracts Office of the University of Cape Town has undertaken a site sensitivity analysis as a contribution to the Scoping report for the proposed construction of a Conventional Nuclear Power Station on one of five identified possible sites on the coastal zone of the Western Cape, Northern Cape and Eastern Cape provinces. The study, which is based on available knowledge at this time, has revealed that every one of the sites contains heritage resources generally protected by the National Heritage Resources Act 25 of 1999. Preliminary indications are that mitigaton is most likely to be successful at the sites of Brazil and Schulpfontein in the Northern Cape and most difficult to achieve at the sites of Bantamsklip (Western Cape) and Thyspunt (Eastern Cape). Mitigation is also achievable at Duynefontein depending on findings of further studies. Extensive mitigation will be required on all five sites, however the possibility of success is deemed greatest at Brazil.

2 INTRODUCTION

The Archaeology Contracts Office of the University of Cape Town was appointed by Eskom Holdings (as a subcontractor to Arcus Gibb Pty Ltd) to undertake the preliminary identification of heritage sensitivity on five possible sites identified for future construction of a Nuclear Power Station in the Northern Cape, Western Cape and Eastern Cape provinces of South Africa. This study is part of the first step of a full EIA process for the Nuclear 1 project (a scoping report and full Heritage Impact Assessment on favoured alternatives will take place in the future).

The study contained in the following pages is a preliminary study (pre-scoping level) based on prior knowledge and limited site inspection. It is a first step to understanding the kind of heritage that could be impacted and the possible implications of those impacts should any of the identified sites be selected for the proposed activity.

2.1 DESCRIPTION OF PROPOSED PROJECT

The proposed activity is the construction of a Conventional Nuclear Power Station and associated infrastructure (hereafter known as Nuclear 1) on one of five possible sites identified as being suitable for this purpose. The identified sites are:

- Thuyspunt west of Cape St Francis in the Eastern Cape – presently undeveloped and a conservation area;
- Bantamsklip, west of Cape Agulhas in the Western Cape Province – presently undeveloped and a conservation area;
- Koeberg (on the Farm Duynefontein) north of Cape Town in the Western Cape Province – next to the exisiting Koeberg Nuclear Power Station;
- Schulpfontein Punt, north of Koingnaas, Namaqualand Coast, Northern Cape - De Beers Namaqualand mines, diamond mining area; and
- Brazil, south of Kleinzee, Namaqualand Coast, Northern Cape Province, De Beers Namaqualand Mining, diamond mining area.

The Scoping report of which this study is a part, is the start of the process of establishing which of the five sites is considered to be the most suitable candidate for the proposed project. The construction of a Conventional Nuclear Power Station is a complex process – the technology is highly demanding in terms of geographical location, geological stability (site safety), furthermore the design of the structure is dictated by function and safety leaving little opportunity to tailor the design of the structure/s to the landscape qualities that any given locality may offer. In essence the candidate site has to suit the proposed activity. The five

sites selected during the screening process are deemed to be suitable in terms of the technical demands of construction and operation of a Conventional Nuclear Power Station. The task ahead is to identify which one of the five sites is the best in terms of environmental opportunities and constraints.

2.2 TERMS OF REFERENCE

- Attend a project Scoping meeting.
- Attend preliminary site inspections.
- Conduct a preliminary heritage sensitivity analysis based on existing knowledge of the five identified sites.
- Report on the findings.

3 BACKGROUND

The coastal areas of South Africa are considered to be extremely rich in terms of heritage. Included in these areas are not only the full sequence of human history since the Early Stone Age (since 1.5 million years ago) but also palaeontology, and a variety of scenic and cultural landscapes. Coastlines represent the point of interaction between land and sea, which from a heritage perspective is extemely significant. The sea has always been a resource to people and has therefore attracted human settlement and human activities since very early in human history. The South African coast contains more concentrations of archaeological sites than any other part of the country, similarly the nation's oldest colonial settlements are all coastal. Transgressions and regressions of the sea are all manifested in the coastal geology and palaeontology. Thus, the coastal zone of the country is considered to be potentially heritage significant in a number of dimensions:

- Palaeontology
- Archaeology (including maritime archaeology)
- Buildings and structures
- Cultural landscapes
- Places of historic significance
- Oral traditions

In the late 1980's and early 1990's a series of studies were taken out to identify possible sites for the future construction of nuclear powerstations. Of the many sites that were examined around the coast of South Africa, the five sites above were short listed for further study. In terms of heritage, preliminary assessments were carried out by mainly archaeologists in terms of the National Monuments Act of 1969. Since the implementation of the National Heritage Resources Act (25) of 1999, the rules of heritage assessment have changed, the new act is far broader in its scope protecting a much wider range of heritage resources ranging from palaeontology to cultural landscapes and objects. This means that the goal posts have shifted since the original NSIP studies – what may have been acceptable then, may need to be reconsidered in terms of today's values. An important aspect of any future studies will be to reconsider the proposed sites in terms of the new legislative requirements.

3.1 LEGISLATIVE FRAMEWORK

The National Heritage Resources Act 25 (NHRA) of 1999 protects the following, amongst other, heritage resources. Furthermore Section 38 requires that Heritage Impact Assessments (HIA's) are required for certain kinds of development such as rezoning of land

greater than 10 000 sq m in extent or exceeding 3 or more sub-divisions, or for any activity that will alter the character or landscape of a site greater than 5000 sq m. Standalone HIA's are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfills Section 38 provisions. Heritage Western Cape (HWC) is responsible for the management and protection of all Provincial Heritage sites (grade 2), generally protected heritage and structures (grade 3a-grade 3c) in the Western Cape Province. In the Eastern and Northern Cape Provinces, the South African Heritage Resources Agency (SAHRA) assumes the role of the provincial compliance agencies (until such time that these government bodies have been established) as well as National Heritage Sites (grade 1 sites), graves and human remains (all provinces).

Some relevant definitions are included below:

"Archaeological'' means - *material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.* This means that an archaeological site is any area where there are artefacts (objects made by human hand) and ruins that are over 100 years of age. An archaeological find is therefore any object or collection of objects or structures in disuse made by human hand that is over 100 years old. This can range from ancient stone tools, ruins to the contents of historic rubbish dumps containing ceramic shards and bottles.

''Palaeontological'' means - *any fossilised remain 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 which contains such fossilised remains or trace.* The term 'fossil' means mineralised bones of animals, shellfish, plants, marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

"Graves and human remains" are protected by primarily by the NHRA but also provincial ordinances, local authorities and provincial health departments.

''Structure'' means - 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. Such structures may only be altered or demolished under a Section 42 permit issued by the heritage authority.

"Cultural landscapes" are protected by the Act as they are defined as being cultural heritage. Under certain circumstances the compliance authority may intervene and comment on the design and aesthetic qualities of any development that forms part of or is within sight of a heritage place or site or protected area.

"Shipwrecks and aircraft wrecks" in land and in the sea greater than 60 years of age are protected and defined as heritage in terms of the Act.

3.2 ASSUMPTIONS & LIMITATIONS

This study is limited in that it is essentially a desktop assessment based on limited site inspections (not full surveys) and observations by other authors which in most instances were driven by the provisions of old legislation. It is assumed that within these limitations, their data is accurate, but may not be complete. The site of Thyspunt is not known to this author, however the data that is available was systematically collected by a professional archaeologist.

It is assumed that none of the sites have been re-examined in terms of the current national heritage legislation.

4 DESCRIPTION OF THE SITE AND SURROUNDING ENVIRONMENT

All five sites are situated on the coast in contexts that are previouly known to be heritage sensitive in terms of archaeology, and in some instances palaeontology. Four of the five sites are considered to have important cultual landscape qualities of varying significance.

4.1 THYSPUNT

Situated within a nature conservation area just east of Oyster Bay in the Eastern Cape, the proposed site (an amalgamation of the localities known as Thyspunt and Tony's Bay) is undeveloped coastal *fynbos,* Eastern Cape shrub and thicket adjacent to a relatively sheltered bay and a rocky shoreline. A little inland on the coastal plain is an active dune sea. The area is cherished for its wilderness qualities, sense of remoteness and general contribution to sense of place.

A partial archaeological assessment of the area has been carried out by Johan Binneman of Albany Museum in Grahamstown. The site contains numerous shell middens dating to the Late Stone Age as well as scatters of much ealier Middle Stone Age material (40-200 000 years ago), many of these are apparently well preserved and of high significance in archaeological terms. In the sheltered areas of the rocky shoreline complexes of stone walled fish traps have been noted. Thought to have had their origins in the work of Khoekhoen communities, the tidal fishtraps were maintained throughout the historic period by locals and farmers until their use became regulated by government in the early 20th century.

No maritime survey of the shoreline adjacent to the proposed site has ever been completed however, the SAHRA National Shipwreck Databse has records of two sailing vessels wrecked at Thys Bay (the *August* 1858 and the *Derby* 1895).

In summary it is reported that the Thyspunt site is:

- Archaeologically rich in terms of pre-colonial archaeological heritage, but incompletely assessed.
- The colonial period heritage of the site has never been assessed and its significance is unknown.
- The National Shipwreck Database (SAHRA) contains two records of protected shipwrecks.
- The cultural landscape qualties of the site have not been assessed, however it is known that the place is locally cherished as a wilderness area and considered important in terms of the identity and character of the area.
- Palaeontology was not previously assessed but is in all likelihood present in any area of the site with deep sands and calcretous formations.

4.2 BANTAMSKLIP

The Bantamsklip site situated on the south coast about 3 km south east of Pearly Beach is made up of parts of the farm Buffel Jagt and Groot and Klein Hagelkraal. The site may be characterised as an undeveloped coastal wilderness area which is quite diverse in its character. There is a mainly rocky shoreline with shallow bays and short stretches of beach.

Inland of this are densely vegetated dunes (wide diversity of *Fynbos* species). Situated on and close to the property (some 5 km inland) are a series of limestone hills and crags in which are several large overhangs and rockshelters. The area may be considered to have strong scenic values, a diversity of landscapes, powerful wilderness qualities and sense of remoteness. A desktop study conducted by Avery *et. al* (in south coast NSIP) summarised the wide and extensive range of archaeological sites to be found in the Pearly Beach area. Mention is made of numerous shell middens, fish traps as well as shipwrecks. In general, the entire south coast shoreline is considered rightfully by Avery to be archaeologically sensitive. While no specific studies have been made on Hagelkraal itself, the area is known to some archaeologists. There is a reliable anecdotal by David Halkett who mentions that a human skeleton was found in a trial excavation in one of the limestone caves. The excavation was not persued and the remains never exhumed. Lime stone caves similar to these at Byneskranskop were excavated by members of the Archaeology Department at the South African Museum and found to contain a rich sequence of Later Stone Age finds.

During the course of the site visit this year, it was noted that Late Stone Age shell middens formed a continuos ribbon along the entire shoreline pointing to high archaeological sensitivity. In addition, it was noted that the Hagelkraal farmhouse is an adapted historic structure of gradeable heritage significance. Stone walls were also identified close to the shoreline during the site visit.

In summary it is reported that the Bantamsklip site is:

- Archaeologically sensitve in terms of pre-colonial archaeological heritage, but has never been assessed in any sytematic fashion.
- The colonial period heritage of the site, although evident has never been assessed and its significance is unknown.
- The National Shipwreck Database (SAHRA) contains no records of shipwrecks at Bantamsklip (a recent wreck has been noted on the site) but mentions two wreckings in the Pearly Beach area.
- The cultural landscape qualties of the site have not been assessed, however it is a wilderness area with a diversity of landscapes and considered important in terms of the identity and character of the area.
- Palaeontology was not previously assessed but is in all likelihood present in any area of the site with deep sands and calcretous formations.

4.3 DUYNEFONTEIN (EXISTING KOEBERG POWER STATION)

An area to the north of the existing Koeberg Nuclear Power Station, partially within the exisitng nature conservation area, has been identified as a potential site. The construction of the Koeberg Nuclear Power Station in the 1970's provided both archaeologists and palaeontologists an opportunity to examine the deeper sediments that were exposed during the excavations for the facilty. Early Stone Age artefacts were found in deep deposits together with terrestrial fossils. Furthermore a number of Late Stone Age middens were also located, several of which are now preserved in the nature conservation area. These early studies were not formal mitigation excavations but emergency call-out situations. However the interest generated by these finds has perpetuated long term international interest in that the site Duinefontein 2 – a 300 000 year old acheulian and palaeontological site has been the subject of ongoing research by Prof Richard Klein of Stanford University and his multinational team. Klein has indicated that there is a strong chance that further palaeontological material could be found in buried contexts anywhere with the exisitng Duynefontein and neighbouring farms.

The deep excavations that took place for the Koeberg Power Station also produced a deep sequence of marine palaeontology bourne out of the various marine trangression and recessions over the last 15 million years. This points to the fact that the site is palaeontologically sensitive and would need a systemic palaeontological sampling programme if ever developed.

In terms of cultural landscape, Duynfontein is dominated by the presence of the nuclear facility and its support structures. While large tracts of conservation area exist, the dominating force is the contemporary industrial landscape – in other words the wilderness and aesthetic qualities of the place have given way to the ever visible powerstation which has estblished itself as a "place maker".

The history of Duynefontein has never been researched. Its role in the colonial past is unknown. There are no recorded shipwrecks of historical significance off-shore.

In summary it is reported that the Duynefontein site is:

- Archaeologically sensitive in terms of pre-colonial archaeological heritage, particularly deeply buried Pleistocene archaeology and fossil faunas.
- The colonial period heritage of the site has never been assessed and its significance is unknown.
- The National Shipwreck Database (SAHRA) contains no records of shipwrecks of historical significance.
- The cultural landscape qualities of the site are not considered to be significant due to the overwhelming pressence of the contemporary industrial landscape.
- Palaeontological sequence is complex and deep, ranging from buried Pleistocene deposits to ancient Miocene marine fossils.

4.4 BRAZIL

Brazil is a remote locality situated in the Northern Cape Province about 19 km south of the town of Kleinzee. Made up of state land and a portion of the farm Goeraap (De Beers Mining) the site is essentially undeveloped. The area is pitted with geological trial excavations (diamond mining). Very few people visit the area as it is surrounded by restricted access zones. Brazil has been used by concession miners and is visited from time to time by campers who are able to find their way onto the property.

The area is desolate and dry, vegetation is sparse. There are numerous blowouts, stable and unstable dune systems. The shoreline is rocky with several sheltered bays. The place has strong wilderness qualities which have been slightly compromised by various diamond mining trenches. The closest permanent settlement is at Kleinzee to the north.

Brazil was partialy surveyed by archaeologists from the University of Cape Town in 1991. It was found to be archaeologically rich with no less than 46 Late Stone Age shell middens being located within 200 m of the shore during a very quick survey. The archaeology of the area appears to be restricted to Late Stone Age middens with little evidence of earlier material being found. Subsequent to the first survey at Brazil in 1991, annual surveys and mitigation have taken place on all De Beers mining operations. Namaqualand's archaeological sites tend to be be small in size, close to the surface and highly concentrated along the coast. Although they are numerous, mitigation has been successfully carried out on several hundred sites threatened by mining operations. The information gained from these projects has been the basis of a Phd dissertation by Dr Genevieve Dewar of UCT's

Archaeology Contracts Office. During the NSIP survey the heritage of the area was considered to be of medium significance and mitigation was considered feasible.

In summary it is reported that the Brazil site is:

- The colonial history of Brazil has never been researched and its significance is not understood.
- The palaeontology of the site is unstudied, although mine geologists have informal knowledge of marine palaeontology manifested in deep mining excavations in the area.
- There are no recorded historical shipwrecks or fishtraps in the coastal zone.

4.5 SCHULPFONTEIN

This site lies within the restricted access area under the control of De Beers Namaqualand Mines. In many ways, it is very similar to Brazil, although perhaps slightly less impacted by mining trenches. It too is a very remote place, entirely undeveloped. Schulpfontein was incompletely surveyed by archaeologists in 1991. Some 53 Late Stone Age archaeological sites were found along the immediate shoreline, on dune tops and in the two dune seas in the area. These were considered to be generally of medium archaeological importance. In recent years many similar archaeological sites have been mitigated in mining areas.

In summary it is reported that the Schulpfontein site is:

- The colonial history of Schulpfontein has never been researched and it significance is not understood.
- The palaeontology of the site is unstudied, although mine geologists have informal knowledge of marine palaeontology manifested in deep mining excavations in the area.
- A single shipwreck is known to exist on the shoreline (*Baratini*). No fishtraps have been observed in the coastal zone.

5 IMPACTS AND MITIGATION MEASURES

Destruction of tangible heritage inevitably takes place during the construction process of development activities rather than during the operational phases as the main source of impact normally is due to the disturbance of undisturbed ground or landscape and/or demolition of structures and places protected by the National Heritage Resources Act 25 of 1999. Invariably the kinds of impacts resulting are irreversible and of permanent duration. Cultural landscapes are highly sensitive to accumulative impacts and large scale development activities that change the character and public memory of a place.

Archaeological sites, including shipwrecks, as well as fossil deposits and graves, are highly fragile and context sensitive, which means that their value is very easily destroyed when the landscape in which they are situated is disturbed by bulk excavation, installation of services and particularly in this context, the large scale deep (in excess of 20m) excavations that will be needed. Mitigation can be achieved through scientific recording, sampling or excavation however these are also destructive processes. In general, rectification of heritage impacts is

only ever partially possible in the case of archaeology and paleontology, but is possible to a greater degree in the context of built environment where restoration and reconstruction can be achieved (but with loss of authenticity). Generally, the best way to avoid impacts is to identify potential sensitivities first, then to take pro-active measures to avoid impacting the resource and ensure conservation thereafter. Given the fact that all five sites are rich in heritage, large scale mitigation before and during the construction phases will be required.

In essence, impacts to heritage resources in this kind of proposed activity tend to be once-off events that involve permanent physical destruction of the resource and/or its context. Cultural landscapes will be affected by cumulative impacts, however once the impact has taken place, the results are permanent and irreversible.

5.1 PROJECT IMPACTS AND MITIGATION MEASURES

5.1.1 PROJECT IMPACTS ON THE ENVIRONMENT

Physical impacts to palaeontological and archaeological heritage are expected on all five sites. The threat is the physical destruction of heritage during the land clearing and excavations for the construction of the Nuclear Power Station and associated infrastructure.

The introduction of new large intrusive structure/s will result in cultural landscape impacts on all sites, however less so at Duynefontein where an industrial character has already been established.

5.1.2 MITIGATION MEASURES

Impacts of a physical nature will need to be mitigated through extensive archaeological and palaeontological sampling programes followed up by monitoring on all five sites.

Brazil and Schulpfontein: It is anticipated that sucessful mitigation will be most easily be achieved on the Brazil and Schulpfontein sites as these archaeological sites tend to be of shallow depth (single occupation horizons) and close to the surface. In terms of palaeontology there is a body of experienced mine geologists who could provide information on what sediment bodies contain sensitive material.

The historical significance of these areas is anticpated to be low, while the structures will be visually intrusive the landscape of mining will be able to absorb the impact better than on the south coast.

Duynefontein: While Duynefontein does not contain the number of immediately visible heritage sites known to exist on the other four sites, experience has shown that the heritage of the area tends to be buried below surface which means it is extremely difficult to implement successful mitigation. Extensive trial excavations will be required, which may, or may not produce results. Should a sensitive palaeontological site such as Dynefontein 2 be found to exist, the excavations required to mitigate this will be time consuming and extensive.

Given that Duynfontein is an established industrial site, it is anticipated that in terms of “sense of place” the character of the site will not change greatly with the addition of further industrial structures.

Bantamsklip: Successful mitigation will involve extensive archaeological, and if necessary palaeontological sampling. South coast sites have been known to contain deep complex sequences which means that mitigation is likely to be lengthy and expensive.

Construction of seawater inlets and outlets could cause destruction of maritime archaeological heritage. Fishtrap surveys will be necessary, survey and rescue of maritime heritage may also be required pending outcome of further investigations.

The intrusion of large structures into this pristine landscape will cause cultural landscape impacts which will be extremely difficult to mitigate given the lack of design flexibility inherent in Nuclear Power Station design.

Thyspunt: Successful mitigation will involve extensive archaeological and, if necessary, palaeontological sampling. South coast sites have been known to contain deep complex sequences which means that mitigation is likely to be lengthy and expensive.

Construction of seawater inlets and outlets could cause destruction of maritime archaeological heritage. Fishtrap surveys will be necessary, survey and rescue of maritime heritage may also be required pending outcome of further investigations.

The intrusion of large structures into this pristine landscape will cause cultural landscape impacts which will be extremely difficult to mitigate given the lack of design flexibility inherent in Nuclear Power Station design.

5.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.2.1 IMPACTS OF THE ENVIRONMENT ON THE PROJECT

Given the inflexibility of the design parameters of the proposed activity, it is expected that heritage factors will not impact the project in any significant way. In all five sites, it may be necessary to locate (where flexibility is permitted) infrastructure away from identified sensitive heritage sites. In other words, heritage issues may influence the positioning of infrastructure.

5.2.2 MITIGATION MEASURES

Typical mitigation measures may include, where possible, thoughtful and sensitive positioning of infrastructure, development of conservation tools to protect heritage on Eskom property as well as development of educational resources (such as conservation areas and site museums).

6 SITE SENSITIVITY ANALYSIS

6.1 Criteria for Site Sensitivity Analysis

Given that all five sites may be considered to be highly sensitive in general heritage terms, the criteria that has been chosen to grade site sensitivity is “feasibility of successful mitigation”. The likelihood that, given the necessary time and skills, a complete as possible mitigation can be achieved.

6.2 Site Sensitivity

The ranking presented below is from “most favoured (1)” to “least favoured (5)” based on the information that is available at this time. These rankings may well change during the course of the EIA programme as more is learned about the qualities of each individual locality.

1) Brazil: one of the more disturbed sites with cultural landscape qualities already compromised, archaeological and palaeontological mitigation is feasible (already accomplished on mining operations of equivalent size).

2) Schulpfontein: less disturbed than Brazil, however archaeological and palaeontological mitigation is feasible.
3) Duynefontein: an already existing industrial landscape capable of absorbing more industry, however archaeological and palaeontological mitigation is difficult due to deep depths of old land surfaces.
4) Thyspunt: a pristine natural landscape in a scenic area which will not easily absorb the mass and bulk of the proposed activity given the lack of opportunity for mitigation through architecture and design. Mitigation of heritage sites is difficult due to large archaeological sites and dense vegetation cover over potentially complex deposits. Destruction of fish traps and maritime heritage is not easily mitigated.
5) Bantamsklip: extensive shoreline middens will require extensive and potentially difficult mitigation. Dense vegetation cover may obscure material leading to impacts during construction. This is a pristine natural landscape in a scenic area which will not easily absorb the mass and bulk of the proposed activity, and thus diminish the general heritage qualities of the region.

6.3 Discussion and Recommendations

This preliminary heritage study is based on the general state of knowledge of the study areas at this time. This means that given further site inspection and input, rankings may change, but in terms of overall preference, it is unlikely that the sites of Brazil and Schulpfontein will loose seniority in terms of preference. Each one of the candidate sites has areas of sensitivity, some possible to mitigate successfully, others with great difficulty. A great deal more work is need, but until such time that this is accomplished the rankings of sites will stand as a hypothesis which will be put to the test in the forth-coming months.

The gathering of information for the EIA must include:

- A background deeds and archival survey for each of the sites;
- Input from a palaeontologist;
- A physical site survey aimed at refining the existing field information;
- Further maritime research and collaboration with marine geotechnical consultants; and
- At this early stage in the project, the opportunity is taken to inform the proponent that extensive mitigation work will be required on any one of the five selected sites.

7 CONCLUSION

Perhaps the most difficult issue to respond to in heritage terms is the fact that the proposed activity is one that leaves very little opportuinity for negotiation in terms of its design parameters. Unlike a “normal” property development, it is not possible to alter the bulk, appearance or siting of a Nuclear Power Station. The relationship between form, function and safety is to all intents and purposes, complete. This means that in heritage terms, impacts are inevitable – the best that can be done is to manage the resultant loss.

9 REFERENCES

Avery, G. 1974. Open station shell midden sites and associated features from the Pearly Beach area, south-western Cape. *S.Afr. Archaeol.Bull.* 30: 103-105.

Avery, G. 1976. A systematic investigation of open station shell midden sites along the south-western Cape coast. Unpublished M.A. thesis, University of Cape Town.

Halkett, D. 2003 A report on the archaeological mitigation program at DeBeers Namaqualand mines March 2002 to June 2003, Report for DeBeers created by the Archaeology Contracts Office, University of Cape Town, 2003.

Klein, R.G., Avery, G., Cruz-Uribe, K., Halkett, D., Hart, T., Milo, R.G., Volman, T.P. 1999, Duinefontein 2: an Acheulean site in the Western Cape Province of South Africa. J. Hum. Evol. 1999 Aug;37(2):153-90.

NSIP Western, Southern and Eastern Cape Site Specific Environmental Studies. Eskom 1998-1991.

Parkington, J.E. & Hart, T.J.G. 1991, Archaeological assessment of Tweepad, Brazil and Schulpfontein, NSIP project, EEU University of Cape Town.

Schweitzer, F.R. 1979, Excavations at Die Kelders, Cape Province, South Africa: the Holocene deposits. *Ann.S.Afr.Mus.* 78(10): 101-203.

Schweitzer, F.R. & Wilson, M.L. 1982, Byneskranskop 1: A late quaternary living site in the southern Cape Province, South Africa. *Ann.S.Afr.Mus.* 88(1): 1-203.

Webley, L. 1992, The history and archaeology of pastoralist and hunter gatherer settlement in the North Western Cape, South Africa. Unpublished Phd Thesis. Department of Archaeology, University of Cape Town.

GLOSSARY OF TERMS

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

Calcrete A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.

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.

Geophysical survey A scientific study generally conducted by geologists and sedimentologists to describe and assess the below-ground conditions of a given area.

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 2000).

Palaeontological Any fossilised remain 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 which contains such fossilised remains or trace.

Miocene A geological time period (of 23 million - 5 million years ago)

Pliocene A geological time period (of 5 million – 3 million years ago)

Pleistocene A geological time period (of 3 million – 20 000 years ago)

SAHRA South African Heritage Resources Agency

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.

Wreck A ship or an aeroplane or any part thereof that lies on land or in the sea within South Africa is protected if it is more than 60 years old.