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Dear Ms Galimberti

RE: ESKOM EIA CONCERNS FOR THE PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref. No: 12/12/20/944)

REVIEW COMMENT ON HERITAGE IMPACT ASSESSMENT

Mr Tim Hart
Dated: October 2010, Received: May 2011

Environmental Impact Assessment for the Proposed Nuclear Power Station ('Nuclear 1') and Associated Infrastructure

Mr Tim Hart
Dated: March 2011, Received: May 2011

Archaeology and Heritage Mitigation Study for a Proposed Nuclear Power Station At Thyspunt, Eastern Cape, South Africa

Dr John Almond
Dated: July 2008, Received: January 2010

Palaeontological Desktop Study for Bantamsklip (W. Cape) and Thyspunt (E. Cape) Reactor Sites

Comment 1:

INTRODUCTION

The Integrated Energy Resources Plan, gazetted by the Department of Energy on the 6th of May 2011, makes provision for an additional 9 600 MW of energy for South Africa in 2030 from nuclear production. Currently about 1800MW of South African energy is produced by the Koeberg Nuclear Power Station, in the Western Cape, about 40km north of Cape Town.

The initial investigative studies for potential sites to establish new Nuclear Power Stations were done during the 1980s. The original study researched the South African coastline, excluding the previous homelands. The outcome of the study identified five sites, two in the Northern Cape, two in the Western Cape and one in the Eastern Cape. Of the five sites, the two in the Northern Cape were scoped out at the end of the Scoping phase of the EIA process.

Arcus Gibb was appointed by Eskom to undertake the Environmental Impact Assessment process for the Nuclear Power Station 1 project (NPS1) and associated infrastructure on the three remaining sites. At the same time, two different environmental companies, Coastal and Environmental Services and Sivest, were engaged to undertake the Environmental Impact Assessment process for two of the necessary power lines in the Eastern Cape, namely the 132kV and the two 400kV distribution lines.



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A first Draft Environmental Impact Assessment report for the Nuclear Power Station was compiled by Arcus GIBB and released for public comment in March 2010. Heritage Western Cape (HWC) approved both sites at Bantamsklip and Duynfontein stating that: 1. *The recommendations in the HIA were accepted;* 2. *Total destruction of the archaeological sites could not be permitted and HWC will insist on large scale excavations that will generate very large samples;* 3. *Provision for long term storage of the material must be made on site as part of the cost of the project;* 4. *A mitigation workshop must be held to establish the feasibility of the work proposed in order to structure a proper business plan for mitigation of the archaeological and palaeontological resources (HWC Record Of Decision dated 12 January 2010).*

SAHRA commented on Thyspunt, the site proposed in the Eastern Cape, and advised that the development should not proceed at the identified location. This was communicated through the Review Comment submitted to Arcus GIBB on the 30th June 2010. The main reason advanced by SAHRA was that 145 archaeologically sensitive sites were identified in the proposed area. These sites, of diverse heritage significance, represent a unique case on the South African archaeological scenario for concentration, distribution and time span.

After consultation with relevant stakeholders and interested and affected parties, Arcus GIBB, revised the EIA report, and this included both new specialists' studies and an amendment of existing specialist reports.

SAHRA received the revised Heritage Impact Assessment in May 2011 along with a mitigation plan for the Thyspunt site.

Considering all specialists' reports and all areas of sensitivity, Arcus GIBB identified a portion of land of about 175ha (Fig. 1) within Eskom property (about 1600ha) which could be feasible for the construction of the nuclear power plant and associated infrastructure.

Infrastructure associated with the NPS1 will include turbine halls, spent fuel and nuclear fuel storage facilities, waste handling and storage facilities; waste water treatment works, intake and outfall structures into the ocean, desalinisation plant, transmission and distribution lines, access roads, high voltage yard (HV yard), a temporary coffer dam in the ocean for construction, a temporary spoil pipeline into the ocean for construction and laydown areas (from Revised Draft Environmental Impact Assessment Report for the Eskom Nuclear Power Station and Associated Infrastructure (Nuclear-1), Chapter 3).

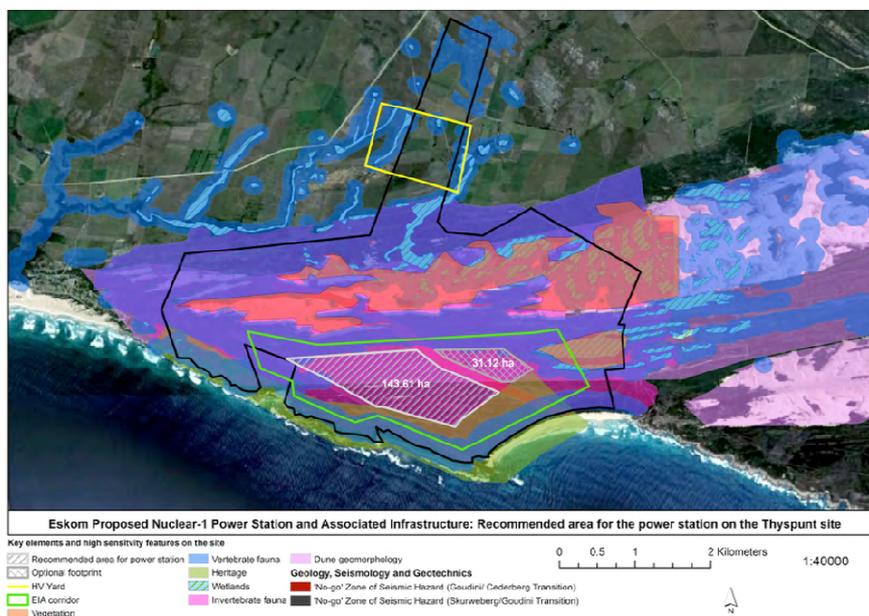


Fig. 1. Proposed position for the NPS 1 (Arcus Gibb, Environmental Impact Assessment Report (Revised Draft Environmental Impact Assessment Report for the Eskom Nuclear Power Station and Associated Infrastructure (Nuclear-1)).

DISCUSSION

The assessment carried out for the Nuclear Power Station 1 is one of the few systematic studies of the Eastern Cape coastline. Previous research in the area include Dr Binneman's 1996 PhD thesis (Symbolic construction of communities during the Holocene Later Stone Age in the Southern Cape year), and work carried out over the years by the Albany Museum and few other scholars (Deacon, H.J., 1995; Cairns, 1975 amongst others). Even before these studies were undertaken, in 1946 Goodwin, in his publication *The loom of prehistory*, stated that "*the southern Cape, from Port Elizabeth to Swellendam, is by far the most important archaeological area in Southern Africa ...here South Africa has evidence of value to the world of prehistory and it is essential that it should be protected so far as it is humanly possible*" (Goodwin 1946:105-106; 116).

The Archaeological Impact Assessment for the Thyspunt area was conducted by the Archaeology Contracts Office (ACO) of the University of Cape Town. The specialist indicated that ground vegetation cover was extremely dense limiting visibility and allowing less than 20% of the study area to be effectively surveyed. Despite this, approximately 145 archaeological sites were identified. The range of the identified heritage resources is summarized as follows by the specialist:

- Middle Stone Age scatters on almost all exposed palaeosoles within the active dune system.
- Numerous well preserved Later Stone Age shell middens within 300-400m of the coastline and in the dunes about 2km inland.
- Six well preserved fish traps.
- Three ship wrecks known to have occurred in Thysbaai during the 19th century.
- The St. Andrews Shack, still in used by the school and with living heritage value.
- Natural wilderness qualities of the area.

In addition, the specialist indicated the significance of the area in the following:

- The area is characterised by a large volume of well preserved shell middens, which are highly significant in terms of Later Stone Age pre-colonial archaeology, especially as representing Khoe-San heritage.
- The Early and Middle Stone Age material identified on the fossil dunes is potentially important in scientific terms, especially if it is preserved in an *in-situ* context on palaeosoles buried under shifting dunes, and associated with fossil bone.
- The cultural landscape significance of the place relates mainly to its superb natural heritage, pre-colonial heritage, setting and contribution to the wilderness qualities of the region.

From a Palaeontological perspective a desktop study was conducted by Dr. John Almond in 2008 and SAHRA commented on it in the Review Comment of June 2010. No revision of this study was undertaken for the revised Environmental Impact Assessment.

The specialist indicated that the palaeontological sensitivity for the Thyspunt NPS is moderate to low. According to the Desktop Study, the Thyspunt NPS overlies the striking contact between the Goudini (NE) and Skurweberg (SW) Formations of the Nardouw Subgroup (upper Table Mountain Group) with relatively low palaeontological significance.

The highly sensitive Cederberg Formation, also belonging to the Table Mountain Group, underlies the coastal plain to the east. Dr Almond and other scholars have previously identified in it post-glacial biota of invertebrates and primitive jawless fish showing soft tissue preservation. Mantling the TMG is the Late Caenozoic Algoa Group, part of which was eroded away during previous interglacials when sea level was higher than at present, however, evidence of it in the form of different formations is still recorded in sections of the Thyspunt area earmarked for development. These formations are the Alexandria and the Nanaga Formations, both located above 18m amsl, underlain the interior coastal plain. While the Alexandria Formation is highly fossiliferous, the palaeontology of the Nanaga Formation is considered sparse. Horizons from the Emian or last interglacial period were located thanks to boreholes studies about 2m amsl and 200m inland. These are attributed to the Salnova Formation of the Algoa Group, a fossiliferous formation, *characterized by rich fossil fauna of shelly invertebrates* ("Swartkops Fauna") *that are of considerable palaeontological and palaeoenvironmental interest*. The unconsolidated surface sand at Thyspunt is formed by the Schelm Hoek Formation of low palaeontological significance.

In view of all the above, and the results of the Archaeological Impact Assessment (Hart, January 2010) and the Heritage Impact Assessment (Hart, October 2010), SAHRA highlighted the following issues:

- a. Thyspunt is a sensitive terrain in terms of heritage resources as evidenced by the presence of many heritage sites at varying intensity and significance from the mid-late Pleistocene to the abundant Holocene occupation. According to the specialist report, because of this abundance of heritage resources, the NPS will likely result in a very high heritage casualty rate.
- b. The HIA identified 145 sites during the initial survey, while a further 30 sites were identified by different surveys undertaken for associated project activities.
- c. Worth noting is that the author states that the total number of archaeological sites could be ten times higher than what he identified during the survey both because of the dynamic of the shifting dune system and because of the thick vegetation cover that hampered survey in some instances. In most road cuttings the exposed profile revealed deep (50-60cm) deposits, mostly of shell middens.
- d. Archaeological sites were identified along the exposed areas both north and south of the proposed location of the NPS1, further increasing the probability of identifying archaeological sites in the central vegetated area. However, the presence or absence of sites in this section will only be clarified once the results of the ongoing test excavations are known.
- e. The character of the site will be irrevocably changed with the presence of both the nuclear power station and its ancillary infrastructure.
- f. In terms of Maritime and Underwater Cultural Heritage, potential impact may occur on wrecks in the vicinity of the outlet and inlet pipes. This is because the warmer water from the plant would stimulate growth of plant life which in turn attracts sea life, including wood borers such as worms. This increase in temperature and marine life would result in wrecks within the area decaying faster than they would normally do in colder water.
- g. Occurrence and distribution of fish traps in the project area were not adequately addressed in the current HIA.
- h. Unique post-glacial biota of invertebrates and primitive jawless fish showing soft tissue preservation in the sensitive unit of the Late Ordovician Cederberg Formation will require extensive mitigation.

The proposed NPS1 project and its associated development activities therefore have high potential impact on this rich and unique heritage landscape (Fig. 2). The proposed Thyspunt site is considered as a complete and holistic cultural landscape with a uniquely long evidence of the history of the country.



Fig. 2. Map of all known sites in this section of the Eastern Cape shoreline, which includes the area earmarked for the proposed Nuclear Power Station 1.

Response 1:

Your comments are noted and responses are provided as per your numbering above for ease of reference.

a. to d.

A sensitivity analysis of each of the alternative nuclear power station sites was undertaken, based on the findings of the relevant specialists and their identification of sensitive areas on the sites. These sensitive areas have been overlapped to produce a composite sensitivity map and hence indicate an area that would affect the least sensitive features on the sites. In the instance of heritage, the greatest concentration of sensitive sites (in terms of number, variety of ages and condition) occur along the western coastline of the Thyspunt site, within 200m from the coastline. There is also a lesser concentration of archaeological sites along the eastern coastline and then a more widely distributed collection of archaeological sites in the mobile dunes on the northern portion of the site. The recommended position for a power station at Thyspunt, given these findings, was roughly in the centre of the site, in the vegetated dunes.

As indicated by your comments, there was uncertainty about the occurrence of additional archaeological sites within this central area of vegetated dunes. However, in the time since the Revised Draft EIR was released for public comment, the ACO has conducted additional test excavations at the Thyspunt site (under authority of SAHRA through a permit for test excavation). The finding of these test excavations is as follows (from the Revised Heritage Impact Assessment, which considers the test excavation results):

"The potential for destruction of Late Stone Age middens will be particularly acute with respect to areas within 300 m of the coast and very much less acute further inland in the vegetated dune areas. The location of the facility will be a key factor in determining the extent to which impacts will occur. Any facilities placed within 200 m of the rocky shoreline or crossing the rocky shoreline will result in impacts. However, if a site were to be selected adjacent to Thysbaai beach, or within the vegetated dunes as proposed, the degree of impact will be greatly reduced as Late Stone Age middens tend to be more common adjacent to rocky shores, and in areas where there are surface water sources."

- e. It is agreed that the sense of place will be changed. Although other forms of impact can be mitigated, there is little mitigation that can be applied to mitigate the change in the sense of place due to the presence of a large structure such as a nuclear power station. The mitigation measures recommended in the EIR therefore focus on ensuring that there are sufficient benefits to the project to offset the potential negative impacts of the power station e.g. proper curation of the archaeological artefacts through a purpose-designed on-site curation and educational facility and the creation of a larger conservation area around the power station (including sensitive ecosystems outside the land currently owned by Eskom).
- f. As indicated in the Revised Draft EIR (Version 1) and in its Consistent Dataset (Annexure C), the cooling water will be chlorinated to prevent the growth of plants that could clog the cooling water inlet and outlet pipes. Furthermore, due to the offshore release of the warmed cooling water, release at or near the sea bottom and the design of the outlet release points, warmed cooling water will be dissipated very quickly. For instance, the Marine Ecology Assessment (Appendix E15 of the Revised Draft EIR) concludes that if a nearshore outfall is used at Thyspunt a mean increase of 3°C near the seabed will be limited to an area of roughly 0.2 km² (2 ha) around the outlets of a 4,000 MW plant and an area of 0.7 km² will experience a maximum increase of 3°C or more at any time. Section 2.2.2. of the Heritage Impact Assessment (Appendix E20 of the Revised Draft EIR) is entirely devoted to a discussion on fish traps while the site inventory in the report appendices contains co-ordinates of fish traps. The fish traps at both Thyspunt and BantamsKlip lie effectively outside the development envelope, which commences 200m from the high water mark. The likelihood of any impacts on the fish traps is very unlikely indeed and it was therefore not considered necessary to discuss the fish traps in further detail.

The palaeontological report states with respect to the highly fossiliferous formations: "These formations are the Alexandria and the Nanaga Formations, both located above 18m amsl, underlain the interior coastal plain." The recommended site for Nuclear-1 lies on sands that are mainly deeper

than 18 m amsl and not on the interior coastal plain. The formation spoken of lies at a higher elevation and is a feature of the inland coastal plain. Indications are that the Thyspunt site will not encroach on this formation. However the presence of fossil material cannot be ruled out until the ground surface is opened and bedrock is penetrated. Fossil shell deposits relating to the Eemian transgression are possible. However, it is likely that this material is well represented at numerous locations along the south coast. Mitigation, if necessary, is feasible and could be implemented as bulk sampling during excavation. As a general rule successful exposure and mitigation of palaeontological material can take the direction of a positive impact as deeply buried material which under normal circumstances is very seldom exposed, finds its way to the surface, thus making a contribution to science. It must be noted that trial excavations found no evidence of old marine deposits at depths of up to 2 m below surface within the recommended development area, although these could occur at deeper elevations.

Comment 2:

CONCLUSION AND RECOMMENDATIONS

1. In line with the provisions of sections 38(3) & (4) of the National Heritage Resources Act SAHRA considered the revised heritage impact assessment and is of the view that the development may not proceed at the current location based on what is stated in this document, along with the following reasons:
 - a. Thyspunt is a sensitive terrain in terms of heritage resources as indicated by the 145 sites identified during this HIA process and additional sites recorded during other surveys.
 - b. Thyspunt is considered a cultural landscape based on the cumulative significance of the sites which *are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal* (Unesco Operational Guidelines for the Implementation of the World Heritage Convention from 2005).
2. For the reasons outlined in this review comment, mitigation is not considered an option by SAHRA.
3. SAHRA observes that no alternatives, which would have probably been feasible in terms of heritage resources, were considered in proximity of the proposed Thyspunt site.

Response 2:

1. and 2.

Your comment is noted. As indicated in Response 1, the recommended position of the power station is such that the greatest concentration of archaeological sites on the Eskom property will not be directly affected by the power station. The largest concentration of sites is within 200 m of the coast, which will be left undeveloped. The central portion of the site within the vegetated dunes has been found, through test excavations that were permitted by SAHRA, to be free of significant heritage sites. SAHRA is therefore requested to study the findings of the test excavations before making a decision in this regard, as SAHRA does not yet have all relevant information in its possession. A revised heritage Impact Assessment, which includes the findings of the test excavations, will be provided for SAHRA's comments together with the next revision of the EIR.

3. SAHRA's attention is drawn to Response 1, where it is pointed out that sensitivity analysis of the sites was performed and that the recommended position of the power station is in the area with the lowest heritage sensitivity.

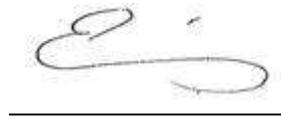
Comment 3:

In the event that the consenting authority is inclined to permit the development to proceed at the current location, despite SAHRA's objection to this, SAHRA must be consulted and afforded the opportunity to provide input and guidance on how the impact on heritage resources may be minimised.

Response 3:

Your comment is noted. In terms of the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998), in terms of which the Department of Environmental Affairs is mandated to make its environmental authorisation decision, this Department is required to consult with other government bodies (including SAHRA) who have any form of jurisdiction or interest over the matters concerned.

Yours faithfully

A handwritten signature in black ink, appearing to be a stylized 'S' or similar character, positioned above a horizontal line.

For GIBB (Pty) Ltd
The Nuclear-1 EIA Team