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Tesselaarsdal Action Group  
The Executive Committee and Members

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and all members

Dear TAG Members

**ESKOM ENVIRONMENTAL IMPACT ASSESSMENT (EIA: 12/12/20/944) FOR A PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE: COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

Arcus GIBB acknowledges receipt of the submission received from Tesselaarsdal Action Group discussing the above report. We thank you for your valuable comments and your participation in the Eskom Nuclear Power Station (NPS) Environmental Impact Assessment (EIA) process to date. Your questions and comments concerning the Nuclear-1 have been noted.

**YOUR COMMENT**

We are immensely relieved to find that the specialist reports in this DEIR have resulted in the Bantamsklip site being effectively taken out of contention for the proposed Nuclear 1 project. However, as was indicated to us at the public meetings during March 2010, the Bantamsklip site will still be reconsidered for the Nuclear 2 application which Eskom intends submitting during the latter half of 2010, and then possibly Nuclear 3 depending on the outcome of Nuclear 2. We would hereby like to submit that Bantamsklip be taken off any and all future lists for proposed nuclear development or any other form of Eskom project, given the high level of local opposition, the eco-heritage and unspoiled sense of place of the area, the current cumulative findings by the various specialists, and the cost and logistical implications that make this site unsuitable for such development.

The comments contained in this document thus mainly focus on the Bantamsklip site or how other information relates and compares to the assessments of this site.

We would like to have it noted that consideration must be given to the fact that, with the limited resources available to an organisation like TAG it is impossible to comment on all the technical aspects and specialist reports in detail, and our failing to do so does not imply that we agree with any of the information, methodologies, statements or conclusions contained in this report or any of the specialist reports included therein.

For ease of reference our comments are listed per the chapter headings of the Draft Environmental Impact Assessment Report (DEIR). Where quotations from the report have been incorporated, certain items have been highlighted in red by ourselves for emphasis.

## **RESPONSE**

Your comments are noted. Nuclear-2 and Nuclear-3 are outside the scope of GIBB's current EIA appointment.

## **YOUR COMMENT (CHAPTER 1)**

### **CHAPTER 1 – INTRODUCTION**

It is with some concern that we note that Eskom only predicts a 2% electricity generation capacity through the use of renewable resources by 2030, as opposed to 4% nuclear by the same date. We sincerely hope that Eskom and the SA government's approach to the implementation of sustainable power sources of all types will undergo a radical turn-around within the next few years given public sentiment and the opportunities being offered by investors world-wide (see Annexure A – various newspaper articles which indicate the possible extent, broad-based application and sustainability of particularly wind and solar resources for power generation, and the international trend towards making use of these options)– it is our opinion that SA is in the prime position of being able to become a proud and innovative leader in the use of such technologies, to the benefit and development of the people of SA and the environment at the same time. Government policy must be adjusted without delay in order to allow for maximum use to be made of such abundant resources that this country has been blessed with, most obviously wind, solar and wave power amongst other possibilities. Given Eskom's parastatal status, it is in a prime position to give the necessary impetus to government policy-change in this direction, and it should make use of this opportunity to do so.

With regard to the issue of base load and peak-load electricity supply: extract from page 1

*“To optimally meet the total demand for electricity, it is necessary to have both base-load<sup>1</sup> power stations and peak-load<sup>2</sup> power stations. Base load power stations provide a continuous power supply throughout the day, while peaking power stations (e.g. pumped storage schemes) can typically only supply power during the morning and afternoon peaks. Nuclear and coal-fired power stations are the only feasible options available to South Africa to supply base-load generation capacity.”*

However, this is shown as being not entirely correct by the following extract from Integrated Resource Plan for Electricity 2009 page38-39, which states:

*“Eskom is investigating the use Concentrating Solar Power (CSP) technology due to the following reasons:*

- *The solar radiation reaching the surface of the earth is very dilute about 1 kWh per square meter*
- *Solar radiation is distributed unequally over the surface of the earth*
- *Intermittent; thus it solves the irregularity of solar power availability, which fluctuates with cloud cover and nightfall*
- *CSP converts solar power into thermal energy and in this way this power can be stored and deployed whenever needed*
- *The ability to store solar energy as in above makes it viable as a source of base load power (sic)*
- *There are two types of CSP technologies and they are namely concentrating photovoltaic and concentrating solar thermal.”*

Whilst this technology might be in its infancy, the fact remains that it is possible – it is our feeling that money spent on developing this technology (rather than on nuclear projects) would be money far better spent given the long-term sustainability and benefits to the environment.

In addition we submit that if other renewable energy projects are implemented on a decentralised and regional basis, this will have the result that pressure on the national grid is alleviated, as regions will be able to provide and/or supplement the power needs in their own area, and will also be able to feed in excess power generated into the national grid whenever possible. Such projects will also often not require additional high-voltage lines to be constructed or at least not of such an extensive nature as those proposed for this Nuclear 1 project, and can be connected to existing power transmission infrastructure very easily – the proposed 300MW wind farm “Caledon Wind” is a prime example of this. All of this shows that the difference between base-load vs peak-load could be addressed more quickly and much more cheaply than implementing one massive power station (whether nuclear or coal-fired) that feeds a centralised network, and which will take at a minimum 8 years to come on line, at very high cost to the SA consumer and the environment.

We are extremely dissatisfied with the fact that “...radiological issues will not be assessed in detail in the DEIR and the DEA will not consider radiological impacts in decision-making.” (pg3) as a result of the co-operative agreement between the DEA and the NNR, which was put in place so as to avoid unnecessary duplication of effort. This EIA process must allow the public to be fully informed, allow the public to give comment or question all aspects of radiological issues throughout the EIA process, and be provided the opportunity to challenge a DEA decision in this regard if necessary at the end of the EIA process (before the NNR becomes involved), given that the nuclear aspect is the defining characteristic of this proposed project. As such, and even if it entails duplication of information and effort, it certainly deserves to be fully addressed, both by the EIA process and the NNR approvals process, particularly in light of the fact (as was indicated to us at the public meetings held during March 2010 w.r.t. the DEIR) that the NNR process for approval does not allow for the same public information and participation opportunities as those provided by an EIA process – in fact, we will only get one chance to submit comments or questions, with seemingly little scope to debate or challenge information that is provided in reply. This means that we, Joe Public, have a very limited and wholly inadequate chance to address the issue of radiological impacts even though it is essentially the crux of the matter! This is simply unacceptable.

## **RESPONSE (CHAPTER 1)**

We note your comments regarding the desirability to add renewable technologies to the mix of generation technologies to be used by Eskom. It has been made abundantly clear in the EIR that nuclear generation is not regarded as an alternative to renewable forms of energy generation, but that it is one type of generation in a mix of generation options that must be pursued in parallel. The proportion of the different technologies to be used will be determined by the Integrated Resource Plan that is due to be released during November 2010.

Eskom’s application to the NNR for licensing of the proposed power station has not yet commenced and will only commence once the vendor has been selected. Commencement of this expensive and complicated process in parallel to the EIA process is not practical since NNR cannot issue a Nuclear installation license without an identified and confirmed site.

The NNR’s licensing process does make provision for public hearings and is subject to the provisions of the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000), as are all authorisation processes to which the public has access. The NNR’s process is therefore required to be an open and transparent process.

The agreement between the DEA and the NNR indicates that the DEA would not “make a pronouncement on the acceptability” of radiological safety issues, and that this issue falls firmly within

the ambit on the NNR licensing process. However, at the DEA's request, information relevant to radiological safety issues has been included in the Draft EIR.

Apart from the environmental authorisation, there are more than 30 different other authorisations that need to be obtained before construction of the nuclear power station can be considered. Although it may be ideal for information relevant to all these processes to be considered in parallel, clearly this is not practical.

### **YOUR COMMENT (CHAPTER 3)**

#### **CHAPTER 3 – PROJECT DESCRIPTION**

Considering the extent of the nuclear waste management issues that surround a project of this nature, we are horrified to note that there are currently a total of 936 nuclear reactors of various sorts and types in operation world-wide, with another 47 under construction (as at August 2009). Taking into consideration also the dwindling supply of uranium it begs the question: why would SA contribute to an already global problem w.r.t. nuclear waste by adding more nuclear power stations to the mix, when it has the opportunity of making a significant and rapid impact on its notoriously high CO<sub>2</sub> emission-status by becoming a world-leader in the use of renewable energy resources? And all this with the help of numerous international investors who are ready, willing and able to implement some 10 000 MW-worth of projects in the near future, if given the chance?

The fact that the off-site construction of accommodation and facilities is not part of this EIA is a serious flaw in this process, as it requires an extensive terrain (especially in the case of Bantamsklip, where Eskom would have to build a village for the various workers and personnel due to the location of the site), will have a significant effect on the densification of the area, will put strain on the resources of the area, and will have a marked effect on the sense of place. This EIA needs to assess all the impacts that are concomitant to the project, and this is without doubt a factor that will have extensive, serious and long term consequences on the environment, both during construction of the NPS and then in its operational phase. As such it MUST form part of this EIA.

It is horrifying, to say the least, to read the analysis of the quantities of water consumption, the extent of excavation, the materials required, the quantities of solid non-radioactive waste as well as non-radioactive effluents, the influx of the number of people and the like, that the construction and/or operation of an NPS requires. 'Significant impact' does not do justice to the change in the environment that will result. In the Bantamsklip context this can only be viewed as being completely detrimental to the character and sense of place of the region, particularly with respect to the well-advanced promotion of the area as largely unspoiled eco-destination (the establishment of the Agulhas National Park which is in close proximity being a case in point, in addition to various other private and co-operative initiatives in the region).

As far as the radioactive waste is concerned whether solid, liquid or gaseous, any and all assurances about safety standards, mitigation measures and the like cannot do away with the fact that there will be radioactive emissions into the environment as a result of the NPS, in a myriad of forms, right from the mining stage (the recent Greenpeace report "*Left in the dust – AREVA's radioactive legacy in the desert towns of Niger*" which can be downloaded from [www.greenpeace.org](http://www.greenpeace.org), is an eye-opener in this regard), through to the operational phase, the decommissioning stage and far beyond as a result of waste storage that would not normally be there. The possibility of a complete nuclear melt-down also exists purely as a result of the existence of the NPS, no matter what measures are put into place – accidents do happen, as we all are profoundly aware. Attached Annexure B is a report titled "Assessment of Chernobyl Malignant Neoplasms in European Countries" by M.V. Malko of the National Academy of Sciences of Belarus, which clearly shows the extent of carcinogenic after-effects of the Chernobyl incident and also indicates that regular low-level exposure has a far more significant effect in causing such diseases than was previously thought. As the operational phase of a NPS

brings with it regular low level radioactive emissions into the atmosphere, this is clearly cause for much concern.

We contend that no matter what the suggested mitigation measures are for the various effects on the environment that an NPS project such as this will have, there will never be a guarantee that such mitigation measures will be properly and completely implemented, nor will such mitigation, even if properly implemented, ever be able to completely correct the imbalances caused by the extent of this type of development. In our opinion, the negative effects on the environment of an NPS over its 60-70 year lifetime (and far beyond given the radioactive lifespan of high-level nuclear waste) far outweigh the positive benefit to humans through the production of electricity – especially as there are other ways and means of providing that energy, which do not have the same negative and long-term impacts, and which could be implemented more rapidly and cheaply than the nuclear option.

A further point is that various specialists have assigned 'low' assessments within their sphere of expertise to the direct and/or cumulative impacts (*incremental impacts of the activity and other past, present and future activities on a common resource*) of the project, where 'low' is defined as *there is still significant capacity of the environmental resources within the geographic area to respond to change and withstand further stress*. In this regard we would like to point out that just because the environment has a seeming capacity to absorb more stress does not mean that it should in fact be subjected to such stress, especially where there are other, more viable and less destructive options that should be thoroughly investigated first.

### **RESPONSE (CHAPTER 3)**

Your comments regarding the reduction of Eskom's carbon footprint are noted. This is precisely one of the reasons why Eskom is proposing to build nuclear power stations rather than continuing to rely on coal-fired electricity generation.

Over the full life cycle of nuclear power, from mining of the uranium, iron ore and other minerals, manufacture of the components and construction of the power station, operation and maintenance of the power station through to decommissioning and the management and disposal of waste, nuclear power emits less than 11 grams of carbon equivalent per kilowatt-hour ( $\text{gC}_{\text{eq}}/\text{kWh}$ ) (Dones *et al.* 2003). This is the same order of magnitude as wind and solar power. This is also two orders of magnitude below (i.e. one hundredth of) the average for coal, oil, and natural gas). Apart from these benefits, nuclear power generation does not emit sulfur dioxides (SO<sub>x</sub>), nitrous oxides (NO<sub>x</sub>) and requires much less water than coal-fired power stations.

Based on current knowledge the following separate EIA's will be required:

- **Transmission lines;**
- **Provincial roads to the site excluding the access roads into the site:** This is dependent on discussions with local authorities who have an existing plan to upgrade roads.
- **Staffing village:** According to current information there is sufficient land zoned or in planning to be zoned by local authorities. Should existing suitably zoned land not be available, then it may be necessary for Eskom to initiate an separate EIA process.

The Staff Village will require an area of 44.2 ha and will make provision for the following facilities, as indicated in Appendix C of the Draft EIR and the Social Impact Assessment (Appendix E18 of the Draft EIR):

- Recreation Club;
- Indoor Sport and Function Hall;
- Shop;
- Medical Clinic;

- Entrance Security Building;
- Workshop and Stores;
- Kitchen and Dining Room;
- School for Expatriates;
- Primary School;
- Secondary School;
- Tennis Courts;
- Squash Courts;
- Rugby fields;
- Soccer fields;
- Basketball; and
- Parking for 270 cars.

The above infrastructure will contribute positively towards development in the area and the possibility of attracting other developments and investment in the area that can benefit the adjacent communities. The building and maintenance of above infrastructure during construction and operation will provide a number of job and business opportunities. Running of these facilities will also provide a number of new job opportunities.

In general the facilities will contribute positively towards the social assets of the community at large with positive interaction between the existing and new facilities.

Lastly, Eskom and GIBB are aware of more than 30 different environmental and other authorisations that would have to be obtained prior to construction. Eskom will take a decision on the additional applications once (and if) environmental authorisation for the nuclear power station is granted through the current application process. The environmental authorisation in terms of the EIA Regulations is regarded as a key milestone and Eskom would not like to apply for other authorisations until it has certainty regarding the current application.

## **YOUR COMMENT (DUNE GEOMORPHOLOGY ASSESSMENT)**

### **ANNEXURE E - DUNE GEOMORPHOLOGY ASSESSMENT**

From pg 14 of report w.r.t. Bantamsklip

*“Fossil dunefields with subdued hilly dune topography (Figure 2.8). Remnant subdued fossil parabolic dune shapes can be discerned on aerial photographs, e.g. Figure 2.6. These dunefields are Pleistocene in age, i.e much older than the transgressive dunefields that are Holocene in age. They were probably formed during the last interglacial (about 120 000 years ago), at which time the sea was about 3 m higher than the present level. They have a moderately developed soil, medium grey in colour (Figure 2.9), which sustains a fair variety of plant species: about 3 times as many (73 species) as the much less developed younger soil of the artificially vegetated transgressive dunefields (23 species) (Low, 2008).*

*The fossil dunefields have a moderate sensitivity as:*

- Soil is better-developed, so soil exposed during construction and in soil stockpiles will be liable to wind erosion that winnows the nutrient-rich fines out of the soil, causing a loss of soil nutrients; and
  - *Rehabilitation of vegetation to its natural state will require some effort in order to reach the original species diversity.”*

Per Fig 2.6 pg 15 – the NPS is shown to take over a significant portion of fossil dunefield at Bantamsklip which will result in their permanent destruction on this site.

Bantamsklip has the highest volume and height of spoils stockpile of all of the three sites i.e. it will be more destructive, will take longer to do the work, and have a more significant effect on the marine ecology (given that it is proposed to dispose of the spoils into the sea) than the other two sites.

We note with some surprise, from the layout of the NPS given, that the preferred outfall corridor is subject to the purchase of land to the west of the existing site by Eskom, and that heavy duty roads on the site layout are also shown to be on this land that is not yet owned by Eskom!

From pg 52 of report

***“5.2.2 Dune dynamics and stability of the artificially vegetated mobile dunes on the site, with specific investigation into the viability of constructing infrastructure, transmission lines and access roads***

*Any disturbance or damage to vegetation of the artificially vegetated mobile dunes can be rehabilitated by re-planting the dune sand with suitable pioneer species of indigenous vegetation to re-stabilise the dune sand and using brushwood and drift fences where necessary. The environmental impact will be low.*

*Mitigation: None.*

***5.2.3 Dune dynamics and stability of the naturally vegetated Late Pleistocene parabolic dunes, with specific investigation into the viability of constructing infrastructure, transmission lines and access roads***

*The Late Pleistocene parabolic dunes have a moderately developed soil with nutrient-rich fines so soil exposed during construction and in soil stockpiles will be liable to wind erosion that winnows these fines out of the soil. The environmental impact will be moderate.*

*Mitigation: minimise area being cleared for construction at any one time, wet down these areas. Wet down soil stockpiles, cover stockpiles with brushwood. This will reduce the temporary environmental impact to low. Any disturbance or damage to vegetation can be rehabilitated by re-planting the dune with suitable pioneer species of indigenous vegetation to re-stabilise the dune sand using brushwood and drift fences where necessary. However, rehabilitation of vegetated dunes to their natural state will be difficult, as climax vegetation will have to be re-introduced once the pioneers are established. The environmental impact will be low to moderate.*

*Mitigation: appoint a suitably qualified environmental officer to supervise the rehabilitation of vegetation on the Late Pleistocene parabolic dunes. This will reduce the environmental impact to low.*

***5.2.4 Impact of the disposal of topsoil and spoils excavated from the power station construction site on the above mentioned dune systems***

*There will be no environmental impact on the artificially vegetated dunes or the naturally vegetated Late Pleistocene parabolic dunes. Mitigation: None.”*

In our opinion this is an unacceptable assessment given the volumes and heights of spoil stockpiles, especially as the site would offer mostly fossil dune area for such stockpiles (on eastern side of property) from the maps provided.

And yet on pg 59 (assessment w.r.t. Thyspunt)

***“2 Disposal in vegetated dunefield***

*For this option, the spoil is disposed of within the vegetated dunefield. The stockpile will have a surface area of about 350 000 m<sup>2</sup>, roughly 5% of the total surface area of the vegetated dunefield on the Eskom property. The stockpile will be 25 m high, higher than many of the dune ridges. The dunes and the vegetation on the vegetated dunefield will be destroyed, and the very distinctive natural dune ridge topography will be completely altered. Airflow will be modified significantly, leading to localised speed-up of winds that may result in blowouts and re-mobilizing of dunes.*

*This will be a high impact.*

*Mitigation:*

- *Blowouts can be repaired by placing brushwood or using drift fences on the bare sand surfaces, and then re-vegetating the bare sand with suitable pioneer species.*
- *Re-create the original dunefield topography (elongate east-west ridges) and vegetation as far as is possible. The re-created surface will be unnaturally higher than the surrounding dunes, and so this mitigation will reduce the impact to moderate.”*

Whilst Bantamsklip dunes may not be considered as sensitive as those at Thyspunt, the effects of the disposal of spoil will be more significant given that the extent of spoil to be excavated at Bantamsklip is 4'200'000m<sup>3</sup> **more** than that at Thyspunt and will be 10m higher than the spoil dumped at Thyspunt! As far as we are concerned the impacts are at least equally as high for the two sites, and cannot be suitably mitigated, particularly in the Bantamsklip context given the biodiversity of the area and the fact that rare fauna and flora will be at risk, as well as the fossil dunes, which have been acknowledged as being at least moderately sensitive.

On pg 53 of the report

***“5.2.6 Geomorphologic conservation value***

*The conservation value of the dunefields at the Bantamsklip site is low, considering that other examples of dunefields of their type are hardly impacted (Figure 5.2; Tinley, 1985; Illenberger, 1998).”*

This logic is simply not acceptable – just because there are other examples of the same dune-type elsewhere, makes it seemingly OK to spoil this portion found on this site, which forms part of our unique coastal heritage? And if this approach were to be taken further, then seemingly it's OK to carry on spoiling such sites as long as there are similar ones elsewhere, until there are only one or two left, and **then** we make every effort to preserve and conserve...? Surely not?

Tabulation of impacts w.r.t. Bantamslip pgs 70 – 73 – it seems unlikely to us that most of the issues categorised generally have a low sensitivity, with a high level of reversibility possible, particularly when assessed cumulatively w.r.t. the extent of the entire proposed development and the spoil material that will be generated. We question the contention that there are no irreplaceable resources on this specific site – surely once the NPS is built, what was there is gone forever, and even if there are other sites with similar dune geomorphology, **this** site's dune geomorphology will be permanently transformed and can never be replaced?

**RESPONSE (DUNE GEOMORPHOLOGY ASSESSMENT)**

We take note of your comments. The Draft Environmental Impact Assessment Report and the Dune Geomorphology Assessment has been reviewed and the findings in terms of the impact on the Dune Sytem remain unchanged. Access roads and transmission lines can be built across the artificially vegetated dunefields with low operational impacts. Access roads and transmission lines can be built

across the older naturally vegetated parabolic dunes with low operational impacts after careful rehabilitation.

Topsoil and spoils stockpiles located on the artificially vegetated dunefields or on the older naturally vegetated parabolic dunes will have low operational impacts.

We therefore maintain our stance that the geomorphologic conservation value of the dunefields at the Bantamsklip site is low, considering that other examples of dunefields of their type are hardly impacted

## **YOUR COMMENT (ANNEXURE E - GEOLOGICAL HAZARD ASSESSMENT)**

### **ANNEXURE E - GEOLOGICAL HAZARD ASSESSMENT**

Taking into consideration the following points as extracted from this specialist's report:

On pg 20-21 of the report w.r.t. the Bantamsklip site:

*"The Groenkloof Fault has been accurately located at a distance of 7.5 km from the site, and the Elim Fault at a distance of 4 km SE of the site, but neither of these are considered to be capable (De Beer, 2007a)."*

And further on pg 21:

*"A number of new features are reported below. A few, of the clear dyke-related lineaments within the Site Area were interpreted as fault displacement of magnetic anomalies (Havenga and Raath,,2007), but the majority of these cannot convincingly be interpreted as faults (De Beer, 2007b), and should be considered potential faults only.*

*A preliminary structural interpretation by De Beer (2007b) of the multibeam imagery delineated a number of fractures that may line up with inferred small faults shown in the 1:5,000 scale coastal strip map for Bantamsklip (Andreoli et al., 1989b). The fractures have been given the name of the "Bantamsklip fracture set", which recent investigations (Siegfried et al., 2008) interpreted as a fault called the Bantamsklip Fault. This fault consists of a NE trending zone of intensely brecciated quartzite approximately 50 m wide and display no evidence of being capable.*

*A new feature labelled BM1, the "Bantamsklip south offshore feature" occurs as an E striking negative topographic lineament cutting bedrock near the SW boundary of the Site Area. It is most probably a fault, but its relationship to sediment cover in the SE part of the survey area is not currently clear."*

On pg 34 of the report w.r.t. the Bantamsklip site:

*"Since the Bantamsklip site is situated in a fractured part of the Cape Fold Belt, called the syntaxis, the basement rock of the Site Vicinity and part of the Site Region are intensely faulted. Andreoli et al., (1994) reported extensive evidence for neotectonic activity but only some of this evidence has been verified (De Beer 2006; Siegfried et al., 2008)".*

And pg 45 of report w.r.t. the Bantamsklip site:

*"The airborne, ground, and marine geophysical surveys conducted by the Council for Geoscience and Fugro within the Site Area (8 km radius) and part of the Site Vicinity area (40 km radius) to a large extent complimented (sp) the known onshore and offshore geology at Bantamsklip. The results of the surveys confirmed most of the positions of the major faults and added a better understanding of the exact position of some, e.g. the Groenkloof Fault. Many*

*faults have been identified in the region surrounding Bantamsklip, with very few identified earthquakes. No evidence of any capable fault has so far been found in the site area or site vicinity."*

Whilst on pg 46 of report w.r.t. the Duynefontein site:

*"At least six structures have been identified as having a relatively high seismic potential. Paleoseismic information on these structures is limited, with very little correlation with known seismicity. At present there appears to be little or no evidence for the reactivation of any of these faults, but further investigation may be required."*

And then also the following on pg 36 of the report w.r.t. cumulative impacts:

*"Geological impacts related to the proposed development involve hazards associated with site-specific soil conditions, erosion, slope stability, surface rupture and groundshaking during earthquakes. Since hazardous events of this type, as well as seismological activity, occur infrequently in this region and display high return periods, the cumulative, incremental impact resulting from repeated events in the geological, tectonic and seismological environment is expected to be low. However, it should be remembered that a single initiating event, such as an earthquake, may manifest, sometimes simultaneously, as several geological hazards (for example groundshaking, surface rupture, sediment movement on the continental slope, etc.)"*

One cannot help but be extremely disturbed to read of faults being in such close proximity to existing and potential NPS sites (irrespective of whether these faults are considered to be capable or not, or that seismic events are assessed as being infrequent) and that new fault lines or potential fault lines have been assessed as recently as 2008. The fact remains that the potential for geologic activity, or the knock-on effects of geologic activity from elsewhere, taking place at these sites is higher than in areas where no faults exist, and when this potential is coupled with the potential hazards of such geologic activity on the integrity of a nuclear facility, one's discomfort-level becomes considerably higher (keeping in mind that not only must the operating period of the NPS be considered, but also the fact that high-level nuclear waste will be stored at the site in the longer term).

In addition, given that the Duynefontein site is within fairly close proximity to the Bantamsklip site (approximately 150km), and given their respective geological faults (those closest to each of the sites having been highlighted above), it is not very reassuring to consider that hazardous and seismic events that might originate from either of these sites could have significant and cumulative effects on the other's geology. Then there is also the potential effect of a seismic event outside the immediate proximity of both of these sites (eg. another Tulbagh-like earthquake) given their documented (and potentially undocumented) susceptibility to fault systems.

This specialist's report is detailed and based on well documented and highly technical data. He has made it abundantly clear that the geology of the area (when active) will have more of an effect on the proposed NPS than the NPS will have on the geology. However, no matter what predictive models are applied based on data from the past, there is no way that any specialist in this field can give the assurance that no geologic or seismic activity will or can take place. This is true for any site being assessed, however, when considered in conjunction with an area's propensity to geologic faults, the accuracy of such a prediction must logically become even less in our opinion.

Given the highly technical nature /unfamiliar terminology of this specialist's work, we would like to see a similar schematic cross-section for both the Bantamsklip and Duynefontein sites as was done for the Thyspunt site (Figure 2.4 on pg 15), in order for laypersons such as ourselves to have a clearer picture and better understanding of the geological make-up of these sites, and how these relate to one-another.

From the Executive Summary on page ii

*“However, additional neotectonic studies still need to be completed and the results submitted to the National Nuclear Regulator as part of the Site Safety Report submissions. These studies, which will be done separately from the EIA process, may impact and even change conclusions reached to date, and therefore no final conclusions can be made about site suitability.”*

We submit that such neotectonic studies should be done and form part of this EIA given that this is the only forum where the public are given access to information about the environmental impacts of a project, and where we are afforded the opportunity to assess information and submit detailed comments and/or information in response.

### **RESPONSE (GEOLOGICAL HAZARD ASSESSMENT)**

We take note of your comments.

The Tesselaarsdal Action Group (TAG) correctly recognises that the geological and seismological investigations reported on in the Seismic and Geological Hazard Impact Assessment reports do not attempt to predict of future events, but instead characterise the natural environment so as to better understand the risks deriving from the geological and seismic hazards. Much of TAG’s concerns result from the presence of several faults in the vicinity (the area within a 40 km radius) of the Bantamsklip site. This concern is understood as many people automatically equate the presence of geological faults with seismic activity.

Geological faults are in fact a common occurrence in the earth’s crust and a minority of these are locations for seismic activity. The overwhelming majority of faults that have been identified in the Bantamsklip vicinity are ancient structures and available information indicates that these have not been active since the Mesozoic (a geological era lasting from 251 – 65.5 million years ago). To put it in perspective, it means that the last time that these faults were active, the dinosaurs were still around and India was an island located between Africa and Asia. In contrast the regulations of the US NRC, which is considered to be the most stringent, detailed and tested set of regulations in the world, prescribes that a tectonic feature is considered capable if it has been active in the last ~ 50,000 years, or shows signs of repeated activity within the last ~ 500,000 years. It would therefore be incorrect to automatically consider the identified faults to represent sites for potential geologic activity. However that does not mean that all questions have been resolved and we agree with the proposed mitigation that further neotectonic studies be done. This will be done as part of the SSHAC Level 3 PSHA for Bantamsklip.

In the case of far-field seismic events seismic waves will be propagated indiscriminately through the earth’s crust and deeper levels and there is no reason to assume that it will have a knock-on effect on geologic structures within the vicinity of Bantamsklip. Seismic events may originate from various potential seismic sources, both near and far, and this was considered in the PSHA work done to date. It would therefore be incorrect to assert that a seismic event at one of the three sites (i.e Duynfontein, Bantamsklip or Thyspunt) will have a cumulative impact on the seismic hazard of a second site, as such distant sources would have already been considered in the integration process of the PSHA.

### **YOUR COMMENT (SEISMIC RISK ASSESSMENT)**

#### **ANNEXURE E - SEISMIC RISK ASSESSMENT**

From the Executive Summary of this report:

*“By December 2006 the NNR required additional international involvement and review of the existing PSHAs. Consequently the CGS PSHAs were reviewed by international experts familiar with PSHA for NPSs. Following this review, it was pointed out that the Parametric-Historic SHA methodology used to calculate these baseline figures does not fully conform to the latest guidelines set out by the US Nuclear Regulatory Commission (USNRC). One of the key reasons*

*for this is that the way the method treats aleatory and epistemic uncertainties in seismic hazard analysis, is not consistent with current approaches for nuclear facilities. They indicated the requirement that an appropriate PSHA be carried out using expert opinion, as defined by the Senior Seismic Hazard Analysis Committee (SSHAC) in the United States. After the conclusion of a SSHAC Level 3 study the results will form the new baselines in an updated Chapter of a Site Safety Report (SSR)."*

And w.r.t. the PGA (Peak Ground Acceleration) values assessed for each of the sites i.e.

- " · Thyspunt 0.16g*
- Bantamsklip 0.23g*
- Duynefontein 0.30g*

*None of these exceed the PGA of 0.3g typically used in the seismic design of NPSs, although the values for the Bantamsklip and Duynefontein sites are close, or at this threshold. This will necessitate additional geological investigations and implementation of an advanced PSHA that will follow internationally accepted practice, and in particular, will conform to the requirements of a Level 3 study as defined in the SSHAC Guidelines. The above will not only confirm the reliability of the above results, but may increase or decrease these values. However, the available data indicate that the Thyspunt site has the lowest seismic risk of the three proposed NPS sites, and from a seismic point of view, Thyspunt is the preferred site of the three proposed NPS sites. Furthermore, in the light of the uncertainty as to whether the revised PSHA will result in significantly different PGA values, Thyspunt is the site with the biggest seismic margin to accommodate changes to this value."*

Under point 1.2.4 (pdf report pg 16)

*"In view of the fact that the period of time over which instrumental recordings of earthquake occurrences is extremely short compared to the typical recurrence time of the geological processes involved, it is extremely important to supplement information from instrumental recordings with historical data such as reports of felt effects from past earthquakes, as well as the often costly and time-consuming study of palaeoseismic (fossil seismic) movements along specific structures. This is particularly important for regions of low seismicity, where the infrequent occurrence of larger earthquakes limits the information content from instrumental recordings even more."*

What is abundantly clear from the above is that there is insufficient data, and the current assessment methodology is inadequate, in order for a properly substantiated prediction to be made regarding the seismic risks of the three sites. We contend that this EIA process is incomplete without the results of the SSHAC Level 3 study (which is currently underway) being applied to the assessment of these three sites. It is unreasonable to expect the public to simply accept that the new baselines, which will be applied as a result of the study, should then just be incorporated in a future updated Site Safety Report without any further public awareness or participation in the process. Surely it is in the best interests of the authorities and the public at large to know what the results of the new methodology are, and what new information has become available regarding the seismic risks of each of the sites, so that a comprehensive and definitive assessment of the risk and environmental impact can be made – that is, after all, the purpose of this EIA.

The potential risk is clear and is stated under the heading 'Impact Identification and Assessment' (pdf report pg 27):

*"The proposed project could have a significant environmental impact if it would expose people or structures to potential adverse effects, involving:  
\*Substantial vibratory ground motion resulting from a seismic event."*

And yet, under point 1.2.4 (pdf report pg 18)

*“Subsequently, CGS engaged international experts in the conduct of PSHA for NPSs, which highlighted that the way uncertainties are treated in the Parametric Historic approach is not consistent with current global practice. A key shortcoming of the Parametric-Historic PSHA is that it does not properly address the uncertainties related to the prediction of the ground motion expected at the site.”*

Seen in conjunction with point 6.4 ‘Conclusion’ (pdf document pg 42)

*“The ground shaking hazard from earthquakes represents the most serious geological hazard impacting on the location and design of a new NPS site. Mitigation for this hazard entails definition of the seismic hazard and associated ground motion aided by appropriate geologic/seismic investigations and monitoring. As a result, hazard studies have to provide estimates of the Safe Shutdown Earthquake Ground Motion and the hazard for deformation at or near the surface.”*

it can be seen that, in short, one needs to be able to predict ground motion in order to mitigate this effect, but ground motion cannot yet be properly predicted.....so the mitigation measures cannot then be defined!

In addition to this, one then reads, under point 3.2 ‘Cumulative Impacts’ (pdf document pg 29)

*“Based on current knowledge, the three localities under review are considered suitable locations for standard export NPS’s following the extensive Nuclear Siting Investigation Programme (NSIP). To date no geological evidence has been found that would halt the development of a NPS at any these sites. However, a definitive statement regarding the hazard from surface fault rupture cannot be made until the foundations are excavated at the site. The final level of design ground motion has yet to be determined, but this will influence the design of the plants rather than be a site disqualifier.”*

Effectively this then means ‘we don’t know what we are going to build until we start building’ – and begs the question, what is this EIA all about then, if there is incomplete information and the effects on and by the environment cannot be properly assessed? Given the shortcomings in this assessment process as outlined by the specialist, we are thus somewhat hesitant to accept the statement that the updated methodology will not disqualify the sites – surely the specialist can only be in a position to make this statement once the results of the additional geological investigations and implementation of the advanced PSHA have proven this to be so?

With reference to Bantamsklip specifically:

Under Point 2.2.1 (pdf document pg 23) w.r.t. the palaeoseismicity of the Bantamsklip site:

*“WNW-ESE to E-W trending offshore faults on the NE margin of the Columbine-Agulhas arch, which bound the Bredasdorp Basin on its western side, may pose a larger risk to the site (although they do not seem to be currently seismically active) than NE-SW striking faults. The presence of Early Cenozoic mafic intrusive rocks on the Alphards Bank (Dingle et al., 1983) along the southeastward continuation of the WNW-ESE faults suggests that they may represent important lines of weakness in this area.”*

And under ‘Conclusion and Recommendations’ w.r.t the Bantamsklip site (pdf document pg 41)

*“Many faults have been identified in the region surrounding Bantamsklip, but the site is located in an area of very subdued seismicity with no evidence of prehistoric strong ground motion. Surface deposits makes the characterisation of fault capability of the numerous faults located in*

*relatively close proximity to the proposed site location exceedingly difficult. There is consequently significant uncertainty regarding the seismotectonic model for Bantamsklip.*

*Based on the current state of knowledge there are no disqualifiers for this site, but this still needs to be reconfirmed through the more rigorous SSHAC Level 3 PSHA. The implementation of the mitigation measures listed above and compliance with applicable regulations would reduce the potential impact of uncertainty on the geological and seismological risk.”*

It is alarming to say the least that Eskom proposes to continue to keep Bantamsklip on the list of proposed NPS sites, given the above-mentioned inadequacies and uncertainties regarding the seismological risk of the area and the fact that it scored close to the PGA threshold value, despite the limitations of the current assessment methodology. We submit that this is yet another reason why Bantamsklip should be removed permanently from the list of potential NPS sites.

### **RESPONSE (SEISMIC RISK ASSESSMENT)**

The Seismic Hazard Impact Assessment Report is clear about the fact that the results presented were compiled using a methodology that no longer conforms to international best practice. However, it should be remembered that it is because a change in regulations which took place after the compilation of the PSHA values.

The requirement Eskom puts upon itself to undertake a new PSHA, following an approach corresponding to the latest international best practice, should therefore be seen as a proactive step in ensuring conformance with this best practice. It is also important to note that the international regulatory benchmark used by Eskom (that of the United States Nuclear Regulatory Commission or US NRC) represents the most stringent, detailed, tried and tested set of regulations in the world and that there are several developed countries that does not yet comply to it; including countries with much larger nuclear fleets than South Africa.

A substantial change in the regulatory environment came about with the publication of Regulatory Guide (RG) 1.208 of the US NRC in 2007. However, while no longer conforming to current internationally regulatory practice, the work presented in the report has been subjected to international peer-review and accepted by the NNR at the time that it was undertaken. It is also worth noting that while the additional reviews following the publication of RG 1.208 raised some concerns regarding the compatibility of the methodology employed with the requirements of this regulatory guide, they also highlighted the value and conformance to best practice of the large body of geo-scientific investigations undertaken to date.

The existing information can therefore be used to draw informed conclusions regarding the suitability or otherwise of the sites in question for the development of a NPS. The exact value of ground motion at the site, while a key input to the engineering design of any planned nuclear facility, does not in itself constitute a qualifier/disqualifier for a site. As noted above, the engineering design will be informed by the results of a new PSHA complying with the regulations of RG 1.208. These results are required by the engineers to define the appropriate design loads, however their exact values are not required to make the statement that such engineering-based mitigation measures exist, since this can be inferred from experience in the seismic hazard assessment and seismic design of other nuclear reactor sites in regions characterised by levels of seismicity, and thus expected levels of seismic hazard, comparable to or higher than those encountered in South Africa, such as California and Japan.

The principal disqualifier for any site would be the discovery of a potentially seismically active geological structure at the site or within its immediate vicinity (8 km radius), the reason being that there is currently no satisfactory engineering solution to mitigate the risks related to permanent displacement of the ground caused by surface rupture. An appreciable body of work and investigations carried out over several years by a team of geologists and seismologists has not yet

yielded any conclusive evidence as to the presence of such a structure, which is what is reflected in the conclusion of the report. Nevertheless, the investigators acknowledge the limitations inherent to the data and methodology employed so far and the Seismic and Geological Hazard Impact Assessment reports are quite clear about the fact that not all the questions regarding the geological environment have been resolved and that there is therefore a need for additional work to reduce remaining uncertainties.

The comment regarding point 3.2 under 'Cumulative Impacts' (pg 29) ("*However, a definitive statement regarding the hazard from surface fault rupture cannot be made until the foundations are excavated at the site. The final level of design ground motion has yet to be determined, but this will influence the design of the plants rather than be a site disqualifier*") also refers to the search for a potentially seismically active geological structure at the site or within its immediate area (8 km radius), and not the hazard for ground motion. The last stage of investigations searching for such a capable structure will investigate the bedrock below the plant footprint during excavations in preparation for construction. Should such a capable structure be found, no nuclear power plant may be built at the site, irrespective of the design used.

As noted in the Seismic Hazard Impact Assessment Report, a new PSHA will be undertaken for all three sites, following a SSHAC Level 3 process. Such a PSHA was to start in 2009 and preparations for this work were already made in 2008, but unfortunately it had to be postponed due to financial constraints. The SSHAC Level 3 PSHA should take to two to three years to complete and will utilise a multi-disciplinary and multi-national team of scientists. Specialists within the project team will interact with various national and international experts at project workshops, to ensure that the information included in the PSHA encompasses the centre, body and range of the views and interpretations of the informed technical community. The entire process will be reviewed by a Participatory Peer-Review Panel (PPRP) composed of internationally recognised specialists, whose collective experience and expertise covers all technical aspects of seismic hazard assessment, and specifically the execution of seismic hazard studies within a regulatory context for critical facilities such as NPPs, as well as the study of geology, seismicity and seismic hazard in South Africa and other stable continental regions. The PPRP provides independent review of process and technical assessments in the project.

In summary, while it is acknowledged that the PSHA needs to be redone using a different methodology, several years of seismological and geological investigations have not yet yielded any evidence that would irrevocably prove that Bantamsklip is unsuitable for the development of a nuclear facility in accordance to current guidelines and regulations. A decision that Bantamsklip should be discarded as a potential NPS site can therefore not be made on that information alone. However, the existing information can be used to draw informed preliminary conclusions regarding the suitability of the sites in question for the development of a NPS.

## **YOUR COMMENT (GEOTECHNICAL SUITABILITY ASSESSMENT)**

### **ANNEXURE E - GEOTECHNICAL SUITABILITY ASSESSMENT**

From pg iii of the Report w.r.t. the 'No Go' option:

*"Should it be decided to not construct a nuclear power station none of the above impacts will be introduced. All associated negative impacts will therefore be removed. However, Eskom would sell the Thyspunt and Bantamsklip sites, and possibly parts of the Duynefontein site, under this scenario and there could therefore be other unforeseen negative impacts arising from different property development scenarios."*

Clearly we are in favour of the 'No Go' option being applied to the Bantamsklip site and that the site will forever be removed from any list of potential NPS sites as a result, so that none of the negative impacts of a NPS development will ever take place there. We would also support the sale or transfer of ownership of the Bantamsklip property by Eskom, preferably to SANParks or a similar conservation

organisation so as to expand the eco-tourism trend which is already an integral factor to the region. The specialist's warning, however, regarding possible unforeseen negative impacts in the future due to other development scenarios if the site were to be sold seems rather superfluous, given that there are few other project-types that would have the scale or long-term impact that the currently proposed NPS project would have, in our opinion.

From pg 32 of the Report w.r.t. the impacts of the project on the natural geotechnical environment:

- *Slope failure involving the displacement of soil or rock material resulting in safety hazards and to a lesser extent environmental damage, and resulting from various modes of failure including:*
    - *Static slope failure, the risk of which is increased with increasing slope height and by the presence of groundwater; and*
    - *Slope failure induced by dynamic (earthquake) loads resulting in liquefaction of saturated overburden soils.*
  - *Site disturbance of potentially large areas because the sites, all of which are characterised with overburden sands (albeit at varying thicknesses), will require large excavations because of:*
    - *The confirmed need to found structures on (or in) bedrock in environments where bedrock is overlain by significant sand deposits, meaning that large volumes of overburden sand will need to be removed;*
    - *Potentially challenging groundwater management scenarios rendering lateral support of excavations (in thick sand deposits) risky and demanding shallow (in the region of 20°) cut back slope angles in thick overburden soil deposits –this increasing the size of foundation excavations and thus surface disturbance footprints; and*
    - *The potential need to dispose of large volumes of unusable spoil (excavated sand) material.*
- These potential impacts (all negative) associated with the proposed sites, are assessed for the construction phase of the project below."*

With reference to Table 3.1 pg 33 (Thyspunt), Table 3.2 pg 34 (Bantamsklip) and Table 3.3 pg 35 (Duynefontein) – these give figures of disturbed areas and the excavation volumes for 1 hectare located 500m inland – site averages of 1 630 000m<sup>3</sup>, 330 000m<sup>3</sup> and 1 050 000m<sup>3</sup> respectively. (Where *disturbed footprints* are defined as *excavation and spoil areas* – see pg 36, last paragraph). However, in the Dune Geomorphology Assessment report, the following details and figures are given on pgs 35/36:

*"The figures also show the expected volumes and footprints for topsoil and spoils (sand and rock) stockpiles from the data supplied by Eskom 19 May 2009. The stockpiles can be located anywhere within the property owned by Eskom. Offshore disposal of spoils is also an option that will however not be discussed in this study as it falls within the ambit of the marine specialist and is not relevant to dunefields.*

*The expected volumes and heights of topsoil stockpiles and spoils stockpiles are in the table below. All the topsoil stockpiles are temporary and 1 m high. The length of time for the stockpile again is not known and will depend on the final construction methodology, however assume that it will exist for an extended period of time during construction. Construction will be approximately 6 years*

**Table 3.1. Volumes and heights of topsoil and spoils stockpiles**

	Site Topsoil stockpile volume (m <sup>3</sup> ); all are 1 m high volume (m <sup>3</sup> )	Spoils stockpile volume (m <sup>3</sup> )	Maximum height of the spoils stockpile (m)
a) Duynefontein	184 000		7 800 000
	30		
Bantamsklip	198 000	11 300 000	35
Thyspunt	229 200	7 100 000	25"

This latter table shows that Bantamsklip will have approximately 45% **more** of a spoils volume than Thyspunt, whilst the geotechnical specialist has assessed that Bantamsklip will have an excavation

volume approximately 80% **lower** than that of Thyspunt. There is clearly a radical discrepancy in the values assessed here.

This anomaly aside, the fact remains that this project will require extensive excavations with resultant spoils that need to either be stored/used on site or disposed of at sea. We therefore cannot understand why the specialist has categorised Bantamsklip as being of low intensity, low significance and low consequence when assessing the impact '*Excessive site disturbance resulting in environmental damage (no mitigation)*' (Table 4.2 pg 39) whilst Thyspunt and Duynefontein are given medium and/or high assessments in these aspects. Whilst the character of the terrains and the overburden thicknesses differ between each of the sites, the vast extent of the excavations and site disturbance necessary to establish an NPS and its associated infrastructure (a total of 31 hectares being required for the entire development including HV yard) remains a given, and these will have a significant and lasting effect on the surrounding environment. The specialist's qualification that an NPS at Thyspunt or Bantamsklip should be sited as close as possible to the sea and in areas of minimal overburden as mitigation to reduce these impacts, seems to be wishful thinking when one peruses the site maps of the proposed development and notes the scope/area of the various plants and buildings required – extensive excavations will be required, no matter what.

### **RESPONSE (GEOTECHNICAL SUITABILITY ASSESSMENT)**

With respect to the comments re the no-go option, the TAG appear to be reading the specialist comment (i.e. that the no-go option could result in other more environmentally damaging developments) as a redundant (“superfluous”) comment. There could be different schools of thought on this and perhaps this comment within the geotechnical report could be argued to be superfluous, but it certainly is not within the broader project. Eskom have demonstrated with the KNPS that the environment has definitely benefited due to the restricted access and sound property management principles that Eskom have applied to that site. It is difficult to see why this would be different at Bantamsklip.

The discrepancy in sand volumes results as the calculated spoil volumes vary by orders of magnitude across the site and are influenced by:

- The fact that an indicative 1 ha excavation was considered in the geotech study;
- Groundwater table characteristics and the impact on slope stability and
- Depth of overburden within coastal dune areas (i.e. overburden depths fluctuating radically between dune crests and troughs).

It is probable that the Geomorphology specialist assumed a larger excavation and not the indicative 1ha excavation and it is also probable that this was done under a worst case scenario (i.e. where overburden is thickest).

It is without doubt that, were an ROD to be issued, that one of the primary conditions (aside from issues related to seismic risk) would be to optimise excavation volumes. It is a fact that bedrock outcrops at the sea and any excavations near the sea at Thyspunt and Bantamsklip will require little excavation. Duynefontein is an exception and large excavations will be required practically anywhere on the site. TAG should be made aware that it is only the nuclear island (i.e. the reactors) that absolutely has to be founded on bedrock. Ancillary structures can be founded in dense soils.

### **YOUR COMMENT (HYDROLOGICAL ASSESSMENT)**

#### **ANNEXURE E - HYDROLOGICAL ASSESSMENT**

The fact that rainfall data taking into account climate change is still pending (awaiting the results of a University of KwaZulu Natal regional study in this regard) and that a study on Tsunami data is still in

progress, make this report substantively incomplete, given that we are going to be subjected to the exponentially increasing effects of climate change for many years to come. Given the coastal locations of the three sites we submit that this data **must** be incorporated into this EIA report and subjected to public review, before the report can be finalised and submitted to the DEA.

Our view is substantiated by the following, on pg 87 w.r.t. the observations about the direct impacts on hydrological aspects surrounding the construction and operation of a NPS at Bantamsklip:

*“• Confidence in the impact prediction is lower for the operational phase, a result of extrapolated rainfall data which are not available for the 1:10 000 rainfall event as is required for this type of activity.”*

It is just such impacts, given the long-term nature of this project and its associated and inherent nuclear risks, that must be extrapolated to the ‘worst-case’ scenario in order for the public and the authorities to have any confidence that the proposed structure and the associated mitigation measures planned for, will be sufficient to deal with and withstand such events.

On pg 90 w.r.t. the observations about the cumulative impacts:

*“• The impact is low at a local level, the reason being that this site is isolated and the most significant cumulative impact relates to the commercial and residential activities in the area. A lesser impact is expected during the construction phase than the operational phase, as residential development is only expected to take place in time. Increased run off from hardened surfaces will impact on the surface water bodies and the ocean should mitigation measures not be implemented.”*

Given that 3750 beds for migrant workers will be required and at peak (during the construction phase) some 2400 accommodation units will be required, and that 291.1 hectares of land will be utilised for accommodation, recreation, schools and support facilities for the thousands of personnel necessary on site (per pg30/31 of the Project Description document) the statement that residential development is only expected to take place in time can only be seen as an inaccurate assumption. Such ancillary development must have a substantial effect on the hydrological aspects considered, and we therefore reiterate our objection to the fact that the accommodation aspect of this project is not included in this EIA, but will be dealt with separately. The accommodation issue would not arise if it were not for the proposed NPS project, and as such it is integral to the complete assessment of the impacts of such a project.

On pg 91 w.r.t. the No- go option:

*“Should it be decided to not construct a nuclear power station at Bantamsklip Eskom will sell the land and the stringent controls that would be required and implemented for a nuclear site may not materialise if other types of developments take place. The no go option could then cause a higher negative impact than if a NPS was built.”*

Whilst this may be true, the specialist fails to mention that the converse is also true – if no development takes place, and the site is safeguarded for conservation purposes then only positive impacts could result. Given the location of the site and the proximity to the Agulhas National Park and other conservation-focused areas, it is more likely that this property could be sold/transferred to such organisations, in keeping with the eco-tourism trend in this region of the Overberg.

The statement on pg 93 of the report w.r.t. the potential impact the environment may have on the NPS:

*“Extreme natural hydrological events may have an impact on the site. These include tsunamis, HATs and frequent high rainfall events. The probability of these events occurring is, however, fairly low.”*

Given that the necessary data regarding tsunamis and rainfall predictions as a result of global warming are as yet unavailable, this assumption of low probability should in fact be qualified as being subject to review.

On pg 116 of the report w.r.t. the 'Existing information should be supplemented during the course of the project on the following aspects':

- *Site specific extreme high water level at the Bantamsklip site;*
- *Estimation of a possible tsunami levels;*
- *Detailed footprint and layout of proposed plant areas and ancillary works;*
- *Establishment of possible pollution sources;*
- *Locality and extent of possible future residential / commercial developments in proximity to the proposed sites; and*
- *Quantification of the rainfall difference due to climate change at each of the sites."*

Again it is our contention that all of these items should be included and assessed in this EIA process, not separately and/or at a later date, as the above items are all aspects that have their own and varied impacts on the environment, and as such must be incorporated into the assessment – the EIA report must be comprehensive, so that the public and the authorities are given a holistic and properly considered view of all of the impacts associated with this proposed NPS development.

### **RESPONSE (HYDROLOGICAL ASSESSMENT)**

Response on comments are made in a numbered sequence (Please see comments above for our numbering).

1. Data available at the time of this study, particularly relating to climate change, was incorporated into the Hydrological Assessment. This included a preliminary estimate of the highest astronomical tide (HAT), sea level rise, wave run-up and positive storm surge. Since compiling the assessment additional work has been done in refining the above mentioned data sets. This in turn has improved the level of confidence and will be incorporated into the EIR where relevant. The change in rainfall precipitation is expected to be evolving over time in terms of predicted climate change. A preliminary regional study done by the UKZN ( School of Bioresources Engineering and Environmental Hydrology, R Schulze, Key note address on climate change in Southern Africa, WISA 2010) indicated that there will be an average change in standard deviation between the present rainfall and the future rainfall taken up to year 2100. The initial indications are as follows for the three sites:

- Thyspunt and Bantamsklip : 1.2-1.4 increase in the average change in standard deviation; and
- Duynefontein : 0.8-1.0 decrease in the average change in standard deviation.

The study is currently still in progress. Once the study has been completed and the expected change in rainfall precipitation has been quantified, the hydrological models can be rerun and the sensitivity of the rainfall change on runoff peaks and volumes determined . The level of confidence of the data will also improve with continuous monitoring at the site which is a recommended mitigation measure.

2. The operational phase of the project will be the longest phase of the total project and therefore the probability of having a 1:10 000 year rainfall event is greater than for the construction phase. This is illustrated by means of the Table below which shows the probability of occurrence of an event with a certain return period over a given design life span . Due to the increased probability of having an extreme 1:10 000 year event, mitigation measures will be sized and designed to handle the worst-case " scenario . A sensitivity analyses would also be carried out to determine the potential impact of climate change on the proposed mitigation measures to ensure that the structures remain operational for the lifespan of the NPS.

The impacts of population migration during the construction and operational phases of the project is an additional study which would be carried out once sufficient information on the location of the housing as well as the density and type of housing is known.

Information provided by Eskom's social development document (September, 2008) details the proposed accommodation required for the Nuclear-1 NPS. The detail of accommodation required, and the integration into existing communities and towns, still needs to be negotiated with respective municipalities and other role-players where relevant. The exact location of a possible construction village still needs to be determined. An area of approximately 167.2 ha. would be required to house the construction workers.

The construction of the houses and related infrastructure would have an effect on the runoff from the development due do to an increase in impervious area. The percentage increase in runoff and hence indication of the hydrological impact can be quantified with a hydrological model. This model can, however, only be set up once a more detailed understanding of the type and density of housing and locality is available. The impact in terms of increased runoff peaks and volumes can then be mitigated by making use of attenuation facilities as well as having dedicated infiltration areas within and downstream of the development.

**Recurrence Interval vs Probability Analysis**

RI	Probability of occurrence in X years						Probability of not occurring in X years			
	1	10	100	1000	10000	1000000	100	1000	10000	1000000
10	0.10000	0.65132	0.99997	1	1	1	0	0	0	0
20	0.050	0.40126	0.99408	1	1	1	0.006	0	0	0
50	0.020	0.18293	0.86738	1	1	1	0.133	0	0	0
100	0.010	0.09562	0.63397	1	1	1	0.366	0	0	0
200	0.005	0.04889	0.39423	0.993	1	1	0.606	0.007	0	0
1000	0.001	0.00996	0.09521	0.632	0.99995	1	0.905	0.368	0	0
10000	0.0001	0.00100	0.00995	0.095	0.632	1	0.990	0.905	0.368	0

3. Should no NPS be constructed at this site it can also be mentioned that there is a possibility that the site could be incorporated with adjacent conservation –focused areas such as the Klein Kloof private nature reserve .However, this also cannot be guaranteed and is an unknown at this stage. The Agulhas National Park is about 15 km south-east of the site and hence the chance of incorporating the site into this park is very low due to the significant distance between the sites.

4, It is correct to say that extreme hydrological events such as HATs, tsunamis and high rainfall may have an impact on the NPS. At this stage, however, no accurate predictions on the probability of occurrence can be made due to insufficient long-term data .The impact this would have on the NPS would, however, be quantified and reviewed once further information becomes available. At this point in time one may postulate that the extreme events such as high rainfall for example have a low probability of occurring as can be seen from the Table below.

**Recurrence Interval vs Probability Analysis**

RI	Probability of occurrence in X years						Probability of not occurring in X years			
	1	10	100	1000	10000	1000000	100	1000	10000	1000000
10	0.10000	0.65132	0.99997	1	1	1	0	0	0	0
20	0.050	0.40126	0.99408	1	1	1	0.006	0	0	0
50	0.020	0.18293	0.86738	1	1	1	0.133	0	0	0
100	0.010	0.09562	0.63397	1	1	1	0.366	0	0	0
200	0.005	0.04889	0.39423	0.993	1	1	0.606	0.007	0	0
1000	0.001	0.00996	0.09521	0.632	0.99995	1	0.905	0.368	0	0
10000	0.0001	0.00100	0.00995	0.095	0.632	1	0.990	0.905	0.368	0

From the above Table it can be seen that a 10 year event has a probability of 10% while a 10 000 year event has only got a 0,01% probability of occurring in any one year.

5. It is intended to refine and augment the EIR with updated and higher confidence data where available since compiling the EIR, which includes the following:

- Site specific extreme high water level at each of the sites;
- Estimation of possible tsunami levels at each of the sites ;

Data sets which to date have not been refined and cannot be included at a higher confidence level is:

- Detailed footprint and layout of proposed plant areas and ancillary works;
- Establishment of possible pollution sources;
- Locality and extent of possible future residential / commercial developments in proximity to the proposed sites;
- Quantification of the rainfall difference due to climate change at each of the sites
- Detailed footprint and layout of proposed plant areas and ancillary works.

Once additional and refined data on the above are known relevant modeling can be carried out and changes in impacts quantified.

**YOUR COMMENT (GEOHYDROLOGICAL ASSESSMENT)**

**ANNEXURE E - GEOHYDROLOGICAL ASSESSMENT**

On pg 68 of the report w.r.t. potential contamination pathways – Bantamsklip site:

*“Leaks of any radioactivity will not directly affect any existing groundwater users, but air emissions from the site could be transported inland by prevailing winds (regional pathway) and contaminate groundwater by being incorporated into rainfall recharge. Contamination by air emissions could extend for several kilometres depending on the climatic conditions at the time of the emissions. As a result, the extent of such contamination could impact on users of the Bredasdorp Aquifer, e.g. supplying Pearly Beach and on the aquifers supplying some of the farm boreholes in the area.”*

And from pg 69/70 of report w.r.t. *Ecosystem Water Use and Interaction with Surface Water*

*“The site includes extensive wetlands of high conservation importance, which feed into important downstream systems, such as the Pearly Beach Marsh and the Ratels River wetlands. Bantamsklip lies on the western side of the Agulhas Plain, which extends from the Klein River mouth to the Breede River. The Agulhas Plain is described as containing the largest and most diverse array of wetlands in the southern Western Cape with a high likelihood of*

supporting rare and/or endemic plant and animal species (King et al. 1989). These wetlands exhibit exceptional diversity, in terms of both habitat type and biota.

Conservation of the system in its entirety has been strongly recommended (Jones et al. 2002). Although several seasonal seepage wetlands are thought to occur on Bantamsklip south of the R43 Road (King et al., 1989), the most ecologically important systems occur in the northern part of the site and include the upper reaches of the Koksrivier (a tributary of the Ratels River system) to the east and the Groot Haelkraal River to the west.

The Groot Haelkraal River merges with its westerly tributary, the Klein Haelkraal River, downstream of the R43 and west of the present study area. Immediately downstream of their confluence, the rivers form a wide, coastal lake, referred to as the Pearly Beach Marsh (Jones et al. 2002) and described as a site of Special Scientific Interest (King et al. 1989), by virtue of the combination of different wetland types and substrata that characterise it. The site is classified as being of high regional and local importance from a botanical perspective (Euston-Brown 2003) and in terms of wetland habitat importance (Day 2005). Alien vegetation growth, as well as channelisation of the river downstream of the R43, has resulted in shrinkage and degradation of the Groot Haelkraal riverine wetlands in these reaches, and a reduction in the species diversity upstream (Day 2005). These wetlands, and in particular the less-impacted Pearly Beach Marsh / coastal lake and lagoon, are considered to have high habitat conservation value (Day 2005).

The Koks River flows off the north eastern portion of the site above the R43, and its catchment within the study area includes broad hillside seepage wetlands, occasional seasonally inundated springs or pans and, along the river channel itself, a dense band of *Pronium serratum* (Palmiet) vegetation. The river on the site is believed to be relatively unimpacted and of high conservation importance. The importance of the Ratels River wetlands downstream as a habitat for two red-data frog species has also been noted (Day2005).

No wetlands were identified within the EIA Corridor area.

The natural wetlands identified in the study area would be sensitive to any activities that resulted in their physical disturbance, drainage, infilling or changes to their natural hydrological regime, including both surface and subsurface and / or groundwater flow linkages, and changes in water quality – particularly, nutrient enrichment (Day 2005). The wetlands are also sensitive to any activities that would increase their vulnerability to invasion by alien plants. Important processes that would need to be maintained are likely to include hydrological connectivity and the maintenance of riverine and wetland corridors, between source areas and the sea.”

Given that radioactive emissions into the atmosphere from an NPS are a regular occurrence, and given the variability and often strong wind conditions experienced at the Bantamsklip site (see the seasonal wind roses and tabulation of wind direction & gusts for Bantamsklip on pg 61 and 62 of the Air Quality Assessment), we contend that it is not a case of *could* contaminate, but *will* contaminate – not only putting at risk the users of ground water aquifers as indicated, but also the above-mentioned wetland ecosystems which are of high conservation importance, the surrounding agricultural activities and last but certainly not least the nearby inhabitants which make use of water from various sources. This view is supported by the specialist on pg 149:

“Leaks of any radioactivity into the subsurface and ultimately into the underlying aquifers (both the primary and secondary aquifers) will not directly affect existing groundwater users (but will affect the receiving environment), but air emissions from the sites could be transported inland by prevailing winds and contaminate groundwater by being incorporated into rainfall recharge.”

Pg 136 of report w.r.t. the construction phase of the NPS “Contamination of the Shore Zone – Indirect Impact:

*“It has been shown that groundwater naturally flows towards the ocean. For this reason, any contaminated groundwater will discharge to the sea and could potentially be toxic to marine life. Although any contaminants may be concentrated in a small area, flow will be limited to a small area as well and non-radioactive contaminants will readily dissipate.”*

In our book contamination = toxic, given that it now contains substances that would ordinarily not be there and which the surrounding ecosystems now need to cope with - the table on pg 20 of the Project Description indicates that waste associated with the construction of a NPS includes sewage sludge, concrete sludge, lead batteries, contaminated soils, used oils, residual paints & solvents, tyre- and metal scraps, paper & packaging waste, end-of-life vehicles and waste water treatment (presumably including the chemicals used for this process). Contamination by any or all of these cannot be seen as being anything but toxic to the environment, so to say that it is *potentially* toxic to marine life if contaminated groundwater reaches the sea (irrespective of whether the contamination scale is small or large) cannot be accepted.

Our marine environment is already under enormous pressure from contaminants as a result of human activities – high mercury levels, plastic waste accumulations, oil spills, to name but a few. To simply accept that the sea will dissipate any contaminants (whether over a small area or a large one) merely fosters our modern ‘out of sight, out of mind’ approach. There must be cumulative effects of such dissipation on the environment in the long run – it doesn’t just simply disappear and become nothing, the contaminants end up somewhere with resultant effects on something(s).

*“There is only one potential impact of groundwater on the shore zone during construction of an NPS, namely the disruption of habitat.”*

Frankly, this is hardly a *potential* impact but rather should be seen as a given, in our opinion, as no matter whether it is the construction of the NPS or the mitigation measures that will need to be put in place because of the construction of the NPS, disruption of shore zone habitat due to groundwater or its control measures will be the result.

*“Impacts during operation include:*

- Mortality of organisms;*
- Changes in species composition; and*
- Accumulation of radioactivity in marine organisms.*

*The above may in turn pose risks to the plant which would include blockage of water intakes and fouling of the cooling systems by marine organisms.”*

Never mind the risks to the plant – what about the risks to the people and animals further along the food-chain, who ingest these radioactive marine organisms? And change in species composition, which in itself is a dramatic and lasting impact, has its own cumulative effects on the functioning of entire ecosystems (both marine and terrestrial). When seen holistically, rather than in isolation of specialist disciplines, it is obvious that the impact of an NPS on the environment is radical, long-term and certainly not isolated to the actual site of the NPS itself.

On pg 148 of report w.r.t. the operational phase of the NPS *“Contamination – Direct Impact:*

*“Local release of radioactive effluent at the sites would give rise to long-term impacts of high intensity but of local extent.”*

And because it’s local (site specific and/or immediate surrounding areas) in extent this makes the impact more acceptable? That aside, the crux of this sentence is *long-term impacts of high intensity* which means that a portion of our precious, sensitive, highly prized and at this stage fairly unspoiled and conservation-worthy environment will be sacrificed forever.

*“Air emissions of radioactivity could impact on areas well beyond the site boundaries, as has been indicated by the numerical modelling for  $^3\text{H}$ . However, under normal design operational conditions such releases will be minimal and within accepted dose levels as set by the National Nuclear Regulator. The reactors will also be designed to contain accidents in the core area to within the reactor shields. Impacts of such an accident scenario are therefore not considered here.”*

We cannot accept that the impacts of an accident scenario are not considered by this specialist, on the assumption that NNR dose levels are complied with and that the NPS design will guarantee the containment of such accidents – an EIA must investigate the worst-case scenario on all aspects of the environment and every effort must be made to assess such potential impacts so that both the public and the authorities know what will have to be dealt with in such an event. Not to include such assessments devalues the entire EIA process, as the information that the public requires and is most concerned about is not available.

On pg 149 of report w.r.t. the operational phase *“Degradation of Infrastructure – Direct Impact:*

*“This impact will be of greater significance during the operational phase than during the construction phase, as the foundations and buried services will be established. Indications are that the groundwater at the Duynefontein and Bantamsklip sites could be corrosive.”*

Cumulatively, all of the above are further reasons for Bantamsklip to be taken off the list of potential NPS sites.

Also on pg 149 of report w.r.t. the operational phase of the NPS *“Contamination of the Shore Zone – Indirect Impact:*

*“The potential impact on marine life has been assessed as part of the marine ecological specialist study. This impact is therefore not included in the impact assessment tables. Radioactive contaminants could impact on the sites for a very long time, depending on the half life of the specific contaminants.”*

Such potential threats on the unique biodiversity of the area are simply not acceptable, particularly as there are other far less invasive and risky alternatives for the production of electricity that deserve consideration on a regional and national basis.

## **RESPONSE (GEOHYDROLOGICAL ASSESSMENT)**

The Koeberg Nuclear Power Station has been in operation for some 30 years and there are three operational wellfields and a major unconfined aquifer in relatively close proximity. Two of these wellfields form part of the City of Cape Town’s domestic water supply network to the Greater Cape Town Area. However, there is no evidence that emissions from the KNPS have had any measurable effect on these features. Local groundwater close to the reactors shows somewhat elevated tritium levels compared to background but well below being anywhere near levels of concern for health impacts. There have been no radical and long term impacts on groundwater from the KNPS.

A worst case accident scenario, ie assuming total breach of the reactor containment structures, has not been assessed (and has not been for any of the specialist studies as far as the author is aware) because the results would be self-evident.

## **YOUR COMMENT (FRESH WATER SUPPLY ASSESSMENT)**

### **ANNEXURE E – FRESH WATER SUPPLY ASSESSMENT**

From pg iv of the report:

*“It is recommended that desalination of sea water is implemented at the chosen site for fresh water supply. The main mitigation measures required for this supply option are:*

- *Brine produced as a by-product of the desalination process must be discharged in the surf zone during the construction phase (up to 156 L/s) to facilitate mixing;*

This issue is addressed in our comments regarding the Marine Ecology Assessment further on in this document

- *Brine produced as a by-product of the desalination process must be mixed with the cooling water discharge from the NPS during operation;*
- *A marine ecologist must monitor the discharge areas to assess impacts on marine ecology.”*

One would hope that the marine ecologist would have assessed the impacts of such brine discharge before it actually takes place...!?

Pg 28/29 w.r.t. Contamination of water sources:

*“This would be of local to regional extent involving on-site liquid releases, including effluents from the NPS and brine from desalination, or regional dispersion of atmospheric releases of radionuclides. Under normal operating conditions the latter do not pose a human health risk (see specialist studies on human health risk assessment and geohydrology for more detail).”*

To say that there is no human health risk posed by atmospheric releases of radionuclides is simply not accurate. In fact, the very geohydrological report this specialist refers to indicates, on pg 68, the following w.r.t. Bantamsklip:

*“Leaks of any radioactivity will not directly affect any existing groundwater users, but air emissions from the site could be transported inland by prevailing winds (regional pathway) and contaminate groundwater by being incorporated into rainfall recharge. Contamination by air emissions could extend for several kilometres depending on the climatic conditions at the time of the emissions.”*

In our book ‘contamination’ also = risk. We also refer again to Annexure B in which it is shown that long-term low level exposure to radionuclides is causal to cancers. Citing only the human health risk factor is also misleading, as such contamination affects entire ecosystems and food-chains and therefore is a general environmental health risk, not only a human health risk. Such a summary dismissal of the potential impacts of radioactive emissions, and the failure to consider abnormal operating conditions in this regard is simply not acceptable – how can this report then be considered a proper assessment of the potential impacts of an NPS on the environment?

## **RESPONSE (FRESH WATER SUPPLY ASSESSMENT)**

The Koeberg Nuclear Power Station has been in operation for some 30 years and there are three operational wellfields and a major unconfined aquifer in relatively close proximity. Two of these wellfields form part of the City of Cape Town’s domestic water supply network to the Greater Cape Town Area. However, there is no evidence that emissions from the KNPS have had any measurable effect on these features. Local groundwater close to the reactors shows somewhat elevated tritium levels compared to background but well below being anywhere near levels of concern for health impacts.

## **YOUR COMMENT (FRESHWATER ECOLOGY/WETLANDS ASSESSMENT)**

### **ANNEXURE E - FRESHWATER ECOLOGY / WETLANDS ASSESSMENT**

Pg 8/9 of the report w.r.t. limitations in the scope of study included in this EIA:

*"While the practical difficulties associated with undertaking an EIA that includes all aspects of a NPS, both on and off-site, are recognised, the separation from this study of the assessment of certain infrastructure components such as the routing of transmission lines from each site could potentially result in a net under-estimation of the cumulative impact of the proposed NPS on freshwater ecosystems and an overestimation of potential positive impacts.*

*This aspect was considered particularly relevant to the Bantamsklip site, where there is some argument for assigning aspects of the proposed development a positive impact assessment rating. Liaison with the botanical specialist engaged in the Bantamsklip transmission site EIA (Mr Nick Helme) was however carried out, to limit the risk of under-estimating cumulative impacts associated with the project.*

*The present EIA specifically excluded assessment of staff accommodation associated with the proposed Nuclear 1 developments at the three potential sites."*

We agree wholeheartedly with the specialist that the separation of the two EIAs (one for the NPS and another for the transmission lines) results in the cumulative effects of the construction of such a development being under-assessed – this has been our (and other I&AP's) repeated contention since we became involved in the EIA processes. It is somewhat disheartening, however, that it seems that the majority of the other specialists have not made mention of, or considered this aspect in their reports. The additional separation of the staff accommodation and facilities development to an additional EIA further devalues the entire EIA process, as each of these factors are completely interdependent on one-another and as such will have cumulative impacts on the environment that are now not going to be assessed, or alternatively will not be assessed accurately.

From pg 113 w.r.t. loss or degradation of wetlands as a result of dewatering

*"Figure 4.3 indicates the implications of various dewatering scenarios for wetlands on and associated with the Bantamsklip site. The dewatering cones shown in the figure were supplied in GIS format by SRK (2009), and are based on the outcomes of modelled draw-down scenarios, carried out by SRK (2009).*

*Scenario 1 (represented by Figure 4.3A) illustrates the draw-down associated with dewatering of a footprint representative of full development of the site [assumed to comprise development of three NPSs in the future – note that the present EIA is concerned only with the development of a single NPS]. This figure illustrates an extensive radius of draw-down, extending across the R43, almost as far as the mapped valley bottom wetlands of the Groot Hagelkraal River on the site and potentially impinging on the upper reaches of seeps feeding the Koks River to the east. SRK (2009) describes this scenario as being associated with a maximum drop in groundwater level in the vicinity of the wetlands of <1 m. In terms of wetland ecosystem function, such a drop would be considered significant. Wetlands usually form in the upper 0.5m of the surface, and a drop in water table within even this range can result in dramatic changes in hydroperiod and habitat type, with a drop of more than 0.5m contributing to the likelihood of gradual drying out of the peat soils associated with the dense *Prionium serratum* wetlands of the affected valley bottom wetland.*

*Scenario 1 is not however considered a realistic scenario in terms of the proposed single NPS development at this site."*

It is alarming to say the least that it could even be contemplated to build 3 NPSs on this site 'in the future', given that the cumulative impacts will then be exponentially higher!

On pg 198/199 w.r.t. the summary of outcomes of the impact assessment regarding Bantamsklip:

*"Development of the proposed NPS at Bantamsklip would not be associated with any impacts to wetland systems that are considered unmitigable or that would, once mitigated, result in a negative impact of higher than "low" significance level (Table 5.3). This is because the NPS associated activities would be concentrated in the area to the north (error: should read 'south') of the R43. The impacts that have been assessed revolve around indirect impacts to the ecologically important Groot Hagelkraal wetlands, primarily associated with increased traffic through the area (e.g. affecting the use of the wetlands as a corridor between high lying areas, the estuary and the sea). Other impacts that have been identified include those associated with increased development in the presently small resort settlement of Pearly Beach, and the increase in sewage treatment and water demands, with their potential knock-on effects for wetland systems. Low confidence is attached to this assessment, given the low certainty that the impact could occur."*

We support this specialist's approach of looking at the 'bigger picture' and giving weight to the indirect ramifications of such a project.

*"The recommended mitigation measures for the development at this site are not considered complex. Moreover, the possibilities to bring about positive impacts to wetland ecosystems through implementation of recommended mitigation activities have been assessed as of high positive significance, and thus of bearing in the decision making process for this site. It should be noted however that the actual achievement of these positive outcomes relies on a concerted effort to secure the Groot Hagelkraal wetlands, including their extensive hillslope seeps and adjacent terrestrial areas, and to put in place measures that will assure their management and conservation in the long term. The proposed NPS site is believed to be one of the most feasible vehicles for setting in place such management, based on the observed conservation management at the Duynefontein site, and visible present efforts at both the Thyspunt and Bantamsklip sites in terms of the control of alien vegetation."*

Here, however, consideration is not given to the possibility that even better management of the **entire** site would be possible if the property were left completely undeveloped, and was sold/transferred/incorporated into the greater conservation system around the SANParks Agulhas National Park, given the current marked trend towards eco-tourism in the region.

*"It is however noted that the potential routing of pylons through the northern section of the site – an impact that is not assessed in this EIA – might result in a significant reduction in the positive contribution of these mitigation measures. This issue is of importance, in that the positive impact of mitigation measures such as the declaration and management of a conservation area is weighed heavily in the ranking of alternative sites for NPS development. Their subsequent compromise in developments outside of this EIA's scope would make such weightings incorrect. Informal discussions with Mr Nick Helme (botanical specialist on the Bantamsklip Transmission line EIA) suggests that the proposed transmission line alignments may indeed be associated with substantial impacts to the wetlands of the Ratels River and other wetland systems."*

And on pg 204

*"Although the assessed impacts of the proposed NPS development at Bantamsklip are considered highly positive from a conservation perspective, the likely implications of transmission line impacts (not assessed in this study) inevitably tempers the positive rating of the development."*

Finally! A specialist who is prepared to broach the subject of the cumulative impact of the 'generation' and 'transmission' aspects of this NPS project - this supports our contention that the one most certainly cannot be assessed separately of the other. An accurate decision about the feasibility of this development cannot be made without considering the impacts of the project in its **entirety**.

On pg 157 w.r.t. mitigation measures recommended at Bantamsklip:

*"The setting of "no development" areas on site is considered essential mitigation, and requires consideration of both surface and groundwater interactions between wetlands and development-related activities on the site.*

*The following restrictions on layout within the site as a whole are recommended:*

*i. The area north of the R43 should be managed as a no-go development area for all purposes associated with the construction and operational phases of the proposed NPS."*

This is a vital point and we feel this could have been further emphasised in the specialist's conclusion.

In support of our case that the Bantamsklip site should never again be considered as a potential NPS site, we highlight the following items per this specialist's conclusions on pg 202 :

*"All of the site alternatives include in their boundaries and immediate surroundings wetland systems that are of high ecological importance, relatively unimpacted and considered to be either among the last (in the case of Duynefontein) remnants of particular wetland habitats that have been lost from large areas or, in the case of the Bantamsklip and particularly the Thyspunt sites, they are considered unique systems that are unlikely to be represented in their present form, extent and complexity anywhere else in the world. Their conservation status is extremely high and any threats to their integrity have been assessed as of high negative significance."*

And w.r.t. Bantamsklip specifically:

*"The positive impact rating accorded in this study to construction of the NPS must in reality be tempered by an awareness that it may also be associated with significant negative impacts, which may not be offset by the positive opportunities entailed in conservation and management of the wetlands in the northern portion of the site."*

It is with some concern that we note that this specialist has made absolutely no mention of, or assessment of, the impacts on the wetlands associated with radioactive emissions into the atmosphere (for reference: pg 68 of the Geohydrological report w.r.t. potential contamination pathways – Bantamsklip site:

*"Leaks of any radioactivity will not directly affect any existing groundwater users, but air emissions from the site could be transported inland by prevailing winds (regional pathway) and contaminate groundwater by being incorporated into rainfall recharge. Contamination by air emissions could extend for several kilometres depending on the climatic conditions at the time of the emissions.")*

## **RESPONSE (FRESHWATER ECOLOGY/WETLANDS ASSESSMENT)**

### **Separation of EIAs and Cumulative Impacts**

Cumulative impacts have been discussed where relevant. All specialists were required to assess the potential for cumulative impacts, and are discussed throughout Sections 9.3 to 9.27 of the Draft EIR, where relevant. Potential cumulative impacts are expressly discussed with regards to the selection of site alternatives, particular with respect to the decision to remove Bantamsklip from consideration as a site alternative in Section 9.28(b) of the DEIR.

Whilst it might be ideal to consider the potential impacts of the power station and certain infrastructure components in a single document, this is not practically possible and would result in an unmanageable process and in all likelihood a set of documentation that would make understanding of the key issues impossible. At this stage, the Draft EIR for the power station includes 24 different specialist studies and is a very lengthy document (six volumes). This amount of information is already difficult to manage and digest by the public and tripling the volume of this documentation by including all three power line corridors (most of which include a number of different corridors in widely dispersed areas) is not practical.

It has been stated, in the Draft EIR and in public meetings, that the areas where accommodation will be required will be integrated as far as possible with areas dedicated for housing in the existing planning processes of the local authorities within which the power station is proposed to be located. Where possible, employees (especially operational employees) will obtain accommodation in existing settlements. If new urban development has already been approved in the area of the nearby human settlements, it would be Eskom's preference to make use of the opportunities provided by this rather than create a new for residential development which would then require an EIA.

Eskom has completed initial investigations into housing around all three sites. Apart from Bantamsklip, the current development around Humansdorp, Jeffreys Bay and in the greater Cape Town would accommodate housing needs and therefore would be highly unlikely to require an EIA.

### **Number of Nuclear Power Stations per Site**

The current application is for a single power station on the site and if the application is approved the authorisation will only be in terms of one Nuclear Power Station.

### **No-go option at Bantamsklip**

The current state of the Bantamsklip property is not pristine and although the property is largely undeveloped, its categorisation as "natural" does not imply by any means that it is unimpacted. This property is currently impacted mostly by the invasion of alien species and past and present farming activities, as well as illegal marine poaching activities. If the EIA had found that the Bantamsklip site was not suitable for a nuclear site, it is very likely that Eskom would not hold onto an asset that is not required. In this case the land will be used for another land use, which may include development initiatives.

### **Impact of radioactive emissions on the wetlands**

The impact of radioactive emissions on the wetlands was not considered to be a potentially significant impact.

## **YOUR COMMENT (POSITION OF 1 IN 100 YEAR FLOODLINE REPORT)**

### **ANNEXURE E - POSITION OF 1 IN 100 YEAR FLOODLINE REPORT**

From pg 7 of the report w.r.t. long-term climate change:

*“The final values for changes to the hydrographic parameters described in **Section 3.2** are **tabulated below**. For sea level rise, the value adopted for this study is based on the “Upper end of projections” as given in **Table 2** in **Appendix A**. It is recommended that the “Extreme upper limit” given in the same table be considered in the Nuclear-1 design process, but this extreme limit is not considered appropriate for this flood line assessment.”*

We must query why there should be a difference in approach for this assessment vs. the actual design process - surely a worst case scenario should be applied to such a calculation at this early stage in the assessment of the viability of the three sites, rather than later in the design stage – particularly given the hazardous nature of a nuclear power station, the fact that the most hazardous part of the operational structure of a nuclear power station is located as close as possible to the shoreline, its long term operational phase and the fact that high-level waste will be stored on the site in perpetuity?

Given the variability in the predictions that learned scientists across the world attribute to the potential effects of climate change on sea level rise, it is worrying that this specialist has chosen to take a more conservative approach regarding this factor in calculating the 1 in 100 year floodline – the difference in sea level rise at the ‘upper end of projections’ vs ‘extreme upper limit’ is 1.2m, which is a substantial difference indeed. In addition, the 1 in 100 year floodline that he has shown (which allows for this more conservatively assessed sea level rise) does in fact impact on the EIA corridor along the central and eastern shoreline of this demarcated area, on the map for Bantamsklip. Whilst these flooding points may seem minimal in their current form, it would be safe to say that this assessment would therefore show a far more radical impact if the extreme upper limit data of a 2m prediction in sea level rise had been applied. We therefore submit that this specialist’s data and diagrammatic depiction should be revised to allow for the worst-case scenario, in order for it to be at its most useful.

Our contention that such information must be provided is supported by the air quality specialist report pg 86:

*“The current rise in ocean levels is in the order of 3 mm per year, and it is projected that ocean levels might rise further in future. The IPCC projects a 60 cm rise by 2100. However, in a recent study by Pfeffer et al (2008) this IPCC projection has been regarded as conservatively low. The study found that a total sea-level rise of about 2 m by 2100 could occur under physically possible glaciological conditions but only if all variables are quickly accelerated to extremely high limits. More plausible but still accelerated conditions lead to total sea-level rise by 2100 of about 0.8 m. Therefore assuming the worse-case proposal by Pfeffer et al (2008), it is recommended that a 2m rise by 2100 be regarded as a maximum and that the NPS need to be constructed behind the 2 m line to make sure that the risk of flooding is avoided.”*

## **RESPONSE (POSITION OF 1 IN 100 YEAR FLOODLINE REPORT)**

We take note of your comments. The flood lines have currently been based on a sea level rise as predicted by the internationally accepted IPCC panel. The IPCC’s prediction, based on international consensus amongst recognised scientists, is of a sea level rise of less than that predicted by Pfeffer *et al*. It is therefore suggested that a more conservative approach be taken in consideration when completing the final design of the power station.

## YOUR COMMENT (AIR QUALITY ASSESSMENT)

### ANNEXURE E - AIR QUALITY ASSESSMENT

From pg 2 of the Executive Summary w.r.t Assumptions and limitations:

*“The lack of knowing the specific vendor for the NPS is considered to be significant gap. This is specifically important with regards to the radionuclide emission source term. However, in order to account for the possible radionuclide emissions from the proposed NPS, the source terms from two candidate vendors were included in the assessment. These emissions included both normal and upset conditions. The assessment was therefore based on the most conservative results from these two vendors. It should be noted that in order to comply with NNR requirements, the proposed NPS will have to remain within the emission levels stipulated in its licence.*

One must ask how accurate an assessment can be if the type of reactor that will be installed is unknown – applying an envelope of requirements to the assessment of impacts cannot by any stretch of the imagination be considered to be scientific, specific or even necessarily accurate.

The above segment also begs the question, if the emission levels are not complied with what are the effects on the environment then going to be? Surely this must form part of such an assessment in order to be considered as having considered all the possible ramifications?

Further on pg 2:

*“Catastrophic incidents were not part of the plan of study for the assessment since these incidents are within the jurisdiction and mandate of the NNR. The NNR will evaluate the safety case for the proposed nuclear power station to determine compliance with the requirements contained in Government Notice R388 of 28 April 2006, “Safety Standards and Regulatory Practices”. The NNR process is a parallel process to the EIA. . Thus accident scenarios have not been expressly dealt with in this assessment.”*

And from pg 3

*“Whilst the study included baseline air quality monitoring for non-radionuclides, a radiological baseline study was not included. The NNR requires that a baseline monitoring campaign of radionuclides be conducted prior to construction. Furthermore, the dose limits stipulated by the NNR applies to the incremental dose calculated for the proposed NPS. The conclusions would therefore not change, even once the natural radioactivity has been established at the three sites.*

*This assessment utilised air quality limits which have been given by the Department of Environmental Affairs (DEA) for non-radionuclide emissions and by the NNR for radionuclide emissions, respectively. The assessment of health risks is therefore considered to be at a screening level. The results from this assessment will be used as input into the Health Risk Assessment which would include a more detailed study of the impact of radionuclides on human health and ecology.”*

This is all integral information that is required by those of us who could potentially be exposed to emissions (whether under normal operational circumstances or due to an accident or catastrophic event), however the NNR process does not cater for public participation to the same degree as an EIA process such as this one does. We therefore submit that even though it may be a duplication of time, effort and information, such data **must** be included and assessed in this EIA so that the process can be considered to be comprehensive and fully informative to the public.

Per pg 15 of the report w.r.t. nuclear technologies:

*“The plant types found under the PWR category include:*

- . EPR;*
- . AP1000;*
- . RSA1000; and*
- . VVER1000.”*

Please see attached Annexure C which is an article extracted from the Nuclear Monitor publication which highlights a design flaw in the AP1000 reactor type. Given that this is as yet a reactor type that is not yet in operation anywhere in the world, it is thus also unproven technology. This naturally also begs the question what other design flaws are there in the other types, and why should we subject ourselves to the potential risks of such a nuclear facility when more than sufficient non-nuclear alternatives are available to us?

In addition, in order for 4000MW of power to be generated it would mean, for example, that either 2 EPR units would need to be built or 3 AP1000 units would need to be installed. This means that there will not only be substantial differences in impact during the construction phase, but that the operational phase impacts of each of these scenarios will differ substantially from one another. By requiring the specialists to assess an envelope of requirements cannot therefore be considered as being acceptable methodology. This is in effect supported by the specialist under Conclusions on pg 167, where it is stated:

*“The impact assessment is very sensitive to the definition of the radionuclide source term. An attempt was made to bind the impact through using the emissions from two reactor technologies. Any significant changes to the source term, outside this envelope would have a direct effect on the predicted dose. It is therefore important that the source term of the final selection be checked against the assumptions made in this assessment. The conclusions reached in this assessment will not be supported if the source term is outside of the envelope used in this assessment.”*

On pg 39 w.r.t. land use in the Bantamsklip area – conservation areas shown on the map in this report are most certainly not a true reflection of the conservation status of this region. Per pg 4-84 of the Botany & Dune Ecology Impact Assessment *“CapeNature manages a number of reserves along this coast, at Walker Bay, Uilkraalmond, Pearly Beach and Quoin Point. Although the Pearly Beach Nature Reserve which de facto protects the south-western part of the Bantamsklip site, apparently is not a formal conservation area under the Province but is managed by CapeNature (Gert Greeff, pers.comm.). Groot Hagelkraal Farm is a Private Nature Reserve and Natural Heritage Site.”* See also the map below which shows the formal conservation areas which form the Agulhas National Park, run by SANParks, as well as the internationally funded special management area. Additionally it must be noted that there are also many conservation initiatives that are either privately owned or are co-operative projects within the region which have not been mapped here.  
(Map below extracted from the Save Bantamsklip website [www.savebantamsklip.org](http://www.savebantamsklip.org))



Pg 59 w.r.t. Bantamsklip wind field:

*“The day and night-time wind roses for Bantamsklip in Figure 2-22 clearly illustrates the differential heating and cooling of the air along the coastline, which provides the characteristic diurnal shift in the wind field. Increased south and south-south-easterly (on-shore) winds during the day are typical of the sea breeze conditions created by rising air over the land. Calm periods with an increase in north and north-westerly offshore flow are more prevalent during the night-time.*

According to the Bantamsklip observations, albeit only 21 month's data, east-northeasterly winds dominate, with approximately 16.6% occurrences during this period. Although this wind direction experiences a high frequency of strong winds, i.e. winds in excess 10 m/s occurring 1.6% of the period, the strongest winds are from the west south-west, with 0.02% above 15 m/s. Relatively frequent strong winds are also evident from the west-north-west (~0.01% above 15 m/s). Winds from the north-north-east to northerly sector are on average the lowest (~2 m/s), compared to the average of 5.4 m/s from the east-north-east to south-east-east and west-south-west to west-north-west sectors.” i.e. on-shore winds are prevalent and strong, and must therefore be a factor w.r.t. the spread of radioactive emissions.

Pg 108 w.r.t. predicted air quality impact at Bantamsklip (unmitigated) during construction, shows that this impact will tend to drift towards the wetland areas on the portion of the property north of the R43. Also, on pg 111

*“The predicted particulate unmitigated impact during the construction phase at Bantamsklip is given in Figure 3-3 and Figure 3-4 for the maximum air concentration and deposition rate, respectively. The distance at which it is predicted that the 180 µg/m³ standard will be exceeded is about 1.4 km (north of the site). Similarly, the 75 µg/m³ limit is predicted to be exceeded up to 3.0 km from the site.*

*As shown in Figure 3-4, the fallout is quite significant; with the rate permissible for residential and light commercial (600 mg/m<sup>2</sup> per day) predicted to be exceeded up to a distance of about 0.7 km. The distance to the SLIGHT fallout rate of 250 mg/m<sup>2</sup> per day is about 1.4 km.”*

From pg 112 to pg 141 data and maps are given of the predicted effects of emissions (non-radioactive and radionuclides) during the operational phase of an NPS at each of the three sites, including in different weather scenarios. Whether or not these predicted emissions are within allowable limits and ranges as set by the NNR and other regulatory bodies, the fact of the matter remains that the cumulative effects of all such emissions are felt not only locally and regionally, but nationally. We must again ask – why on earth should the public accept that being subjected to such impacts is acceptable, if there are alternatives that would have the same result as the construction of an NPS, without such potentially hazardous implications for the people and environment of SA?

At this point we would like to refer you to Mr Mike Kantey's comments pertaining to this specialist's report (copy available should this be required), particularly with reference to the technical, scientific and data aspects used in this report, and the objections/comments/queries that he raises – these seem relevant and pertinent and we would appreciate it if we could also receive feedback on the matters that he raises accordingly.

On pg 163 the significance-rating for air pollution impacts at Bantamsklip are tabulated. Given that this tabulation does not take into account the effects of a major accident or catastrophic nuclear event, nor does it take into account the effect of radionuclides that are ingested (as a result of the fallout of radioactive emissions on plants/foodstuffs) by humans and animals in the environment, this assessment can in no way be considered as being complete, and thus cannot be considered to be proper assessment of the impacts.

On pg 165 w.r.t. the 'no go' option at Bantamsklip:

*“The current air quality at the Bantamsklip site is regarded very clean with regards to non-radioactive criteria pollutants, such as oxides of nitrogen, sulphur dioxide and carbon monoxide. Airborne particulate concentrations may become elevated during windy conditions due to wind erosion of dune sand. Any development on the site that would increase vehicle numbers, introduce combustion sources (ovens, boilers, heaters, etc.) or human population would have the potential of increasing the levels of these criteria pollutants. The significance depends on the alternative options, and could result in a HIGH significance.”*

And again, conversely, if the site is conserved in conjunction with other existing conservation areas and not developed, the no go option could result in the current 'very clean' air status being maintained and a positive effect on the environment.

*“Since the current baseline dose at the site is not known, it is not quantitatively possible to provide an accurate “no-go” impact rating for radioactivity. However, limits set by the NNR are sufficiently low to be within natural occurring radiation levels. As an example, the background dose measured in Woodstock for 2008 was 744 µSv/annum (Section 2.4.1), compared to the NNR dose constraint of 250 µSv.*

*Accidental releases from the proposed NPS change the comparison of impacts to the “no-go” option. According to the NNR, the dose resulting from DBAs must be below 50 mSv per event. This could likely be above the natural occurring radioactivity at the site and as such, unless radioactive material is used in any alternative developments, the radio nuclear impact of the “no-go” option would be rated lower.”*

As accidents by definition are unpredictable, as are their results, hoping that DBA's will fall within the NNR limits is rather naive to say the least. Given that there are in all likelihood no other developments

that would make use of radioactive material to the extent that an NPS would, and the fact that radionuclide emissions would take place on a regular basis as well as having the potential of being released accidentally (these factors all having an accumulative effect on the surrounding environment) we feel that the no go option can only be seen as of higher benefit to the region, than the proposed NPS.

On pg 167 w.r.t. Conclusions pertaining to the operational phase:

*“Potential sources of non-radioactive air emissions during the operational phase include:*

- *Carbon, sulphur and nitrogen oxides in the exhaust gases from engines of the backup electricity generators;*
- *Formaldehyde and carbon monoxide emitted by the insulation when installations go back into operation after servicing; and*
- *Ammonia discharged as the temperature rises in the steam generators during start-up.*
- *The predicted impacts of non-radioactive emissions during the operational phase at Bantamsklip and Thyspunt were shown to have a LOW significance. In spite of other air pollution sources in the region of Duynefontein (specifically nitrogen dioxide), based on a baseline air concentration monitoring campaign, the cumulative impact rating at the Duynefontein site is of LOW significance.”*

Here we must reiterate our comment that, simply because an environment such as the Bantamsklip area has been assessed as being able to deal with the added stress of the impacts associated with an NPS, does not mean that it should be subjected to such effects – particularly as we have the privilege of being in a place where the air quality is regarded as being very clean. Our focus should rather therefore be on keeping it that way, surely....?

*“During normal operation, small quantities of radiological materials are released to the environment. This assessment only considered inhalation, cloud immersion and radiation from soil deposition pathways. Ignoring the ingestion pathway, the predicted effective dose from these pathways indicates LOW consequence. However, since the emission is considered to be definite, the significance of the impact is rated MEDIUM. This rating applies for all three sites.”*

As the ingestion pathway issue comes about as a direct result of the air-borne dispersal of the radiological materials it simply must form part of this analysis - by ignoring the ingestion pathway in this assessment, it simply makes it incomplete, which consequently tempers the confidence that we have in the conclusions and calculations of this extensive report.

Further, as the significance of the impact is rated as Medium without taking into consideration the ingestion pathway, it would be fair to assume that if the additional cumulative effect of these emissions on the ingestion pathway of all living things in the area were to be included in the assessment, the significance of the impact would then in fact be pushed closer to or (more probably) into the High category. This impact must therefore be comprehensively analysed in totality, firstly so as to make a truly accurate assessment of the effects, and secondly so as to inform the public more thoroughly about the extent of the impact on themselves and the environment.

*“The dispersion simulations included a number of identified Design Basis Accidents (DBA). The predicted highest whole body dose following such accidental releases from the NPS was shown to be below the maximum acceptable limit of 50 mSv for a single event, as stipulated by the NNR. The highest whole body dose at 1 km downwind from the NPS would be 49 mSv.”*

Given the lack of certainty of what kind of reactor will be put in place, and the limitations in data and methodology applied in this report, as well as the fact that ‘accidental releases’ by definition are unpredictable with regard to length of time and extent, we are somewhat sceptical that it can be said with any confidence that the predicted highest whole body dose will be within the acceptable limit for a

single event. Additionally, what if such accidental releases become multiple events before they are brought in check? What about the cumulative effects of such multiple events on the environment - have these been considered and assessed at all?

Per pg 171, under the specialist's 'Recommendations':

*"No additional mitigation measures are required for routine operational emissions of radionuclides. However, once the final reactor technology has been decided, Eskom need to confirm that the emissions from the selected technology conform to the envelope used in this assessment and that such emissions can be maintained throughout the NPSs lifecycle. This includes a thorough assessment of the reliability and maintenance of the high efficiency particulate air (HEPA) filters which would be used to control radiological air emissions from the NPS;*

And on pg 172

*"Air dispersion modelling must be repeated using the source terms for normal and upset emissions of the successful vendor and onsite meteorological data prior to construction of the NPS. The simulations must be repeated for both non-nuclear and radionuclide air emissions. Furthermore, the methodology for calculating the dose must be done according to the latest international standards and NNR requirements."*

The above begs the question – if the selected technology does not conform to the envelope of criteria applied in this assessment, will a new EIA be embarked on in order to make an accurate assessment of the impacts on the environment? And what if the air dispersion modelling indicates that the current assessment was inaccurate for whatever reason? Will the public be kept informed if it does happen that the technology does not conform to the criteria? What recourse does the public have to ensure that a proper assessment is made of the environmental impacts under such circumstances, and that such new information is made public, if this is the case?

#### **RESPONSE (AIR QUALITY ASSESSMENT)**

Your comments are noted. Please find selected responses below. Please also note that the Air Quality Assessment has been revised and will be made available for public comment as part of the revised draft EIR.

#### **Uncertainty about the Reactor Type and Accuracy of Assessment in Terms of the Envelope of criteria**

As indicated in the Draft EIR, it is an assumption of the EIA process that Generation III technology will be used. It has been made clear in the EIR and in public meetings that if any characteristic of the power station falls outside the envelope of criteria for a Generation III power station defined in Appendix C of the Draft EIR, a revision of the EIA process would be required.

#### **What if Emission Levels are not Complied With?**

Our response above has reference. Also should government or Eskom propose to build a plant that falls outside the specified characteristics assessed in this EIA (including emissions levels), then the EIA would become invalid.

#### **Separation of NNR/DEA process**

The NNR's licensing process does make provision for public hearings and is subject to the provisions of the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000), as are all authorisation

processes to which the public has access. The NNR's process is therefore required to be an open and transparent process.

The agreement between the DEA and the NNR indicates that the DEA would not "make a pronouncement on the acceptability" of radiological safety issues, and that this issue falls firmly within the ambit on the NNR licensing process. However, at the DEA's request, information relevant to radiological safety issues has been included in the Draft EIR.

Apart from the environmental authorisation, there are more than 30 different other authorisations that need to be obtained before construction of the nuclear power station can be considered. Although it may be ideal for information relevant to all these processes to be considered in parallel, clearly this is not practical.

### **Conservation Status of the Area**

Your comment and map provided is noted. The Botany and Dune Ecology Impact Assessment as well as the Draft EIR is currently being revised and any omissions in terms of conservation areas will be rectified.

### **The effect of Strong Onshore Winds on Radioactive Emissions**

Strong onshore winds have not been identified as significant at the Bantamsklip site. Furthermore the predicted maximum effective dose (inhalation and external) for Bantamsklip is given as follows:

<b>Site</b>	<b>Effective Dose (<math>\mu\text{Sv}/\text{annum}</math>)</b>
Bantamsklip	4.60

Government Notice No. R 388 of 2009 specifies that the annual effective dose limit for members of the public from all authorised actions is 1 000  $\mu\text{Sv}$  (Appendix A) with an additional provision of an annual dose constraint of 250  $\mu\text{Sv}$ . The highest predicted inhalation and external effective dose of 11.3  $\mu\text{Sv}$  is therefore about 4.5% of the dose constraint and about 1% of the annual effective dose limit. With the addition of more units to eventually generate 10 000 MWe, the maximum external effective dose would be less than 30  $\mu\text{Sv}$ .

- b) *In terms of Design Basis Accident Releases the nuclear power station must be designed and built to withstand a number of postulated accidents without loss to the systems, structures, and components necessary to assure public health and safety. Design Basis Accidents (DBAs), which could include pipe ruptures, component failure, etc. must be controlled by the safety facilities in such a way that effects on the environment are kept below the specified planning values of the NNR, i.e. the effective dose to a worker or members of the public is less than 50 mSv. A number of DBA releases have been defined for typical PWR technologies. These are described further in Appendix B of the Air Quality Assessment. The predicted maximum ground level air concentration levels for each of the anticipated radio-nuclides per DBA were calculated at increasing downwind conditions. The maximum effective dose per DBA was subsequently calculated using the most conservative Dose Conversion Coefficient (ICRP, 1996) for inhalation. The results have been provided for inclusion in the Health Risk Assessment.*
- c) Assuming the DBA releases to be at ground level (worst-case scenario), the highest whole body dose at 1 km downwind from the nuclear power station at Thyspunt was predicted to be 49 mSv. At 2 km downwind from the nuclear power station the predicted whole body dose was 20 mSv. Similarly, at 5 km, the highest whole body dose was predicted to be 8 mSv, 3.8 mSv at 10 km and 1.0 mSv at 20 km,

respectively. These doses are within the maximum allowable public dose of 50 mSv applicable to accidental releases. Similar values were obtained for Bantamsklip and Duynfontein.

### **The Envelope of Criteria**

- d) *We take note of your comments. The approach to the EIR, of using an envelope of criteria based on a number of commercially available technologies, has been accepted as a valid approach by the Department of Environmental Affairs. The modelling of air and water emissions is, furthermore, based on scientifically verifiable information.*

### **YOUR COMMENT (HUMAN HEALTH RISK ASSESSMENT)**

#### **ANNEXURE E - HUMAN HEALTH RISK ASSESSMENT**

Per pg 2 of this report:

*“Draft Regulations in terms of section 36 (read with Section 47), of the National Nuclear Regulator Act on the siting of new nuclear installations specify that the applicant for a nuclear installation license must submit, in support of its application, a Site Safety Report (SSR) to the NNR comprising the following:*

- 1. Motivation for the choice of the site to ensure a low risk of public exposure from the operation of the nuclear installation(s).*
- 2. Statement as to the proposed use of the site in terms of scope of technologies being considered for proposed nuclear installation(s) and use on the site, including as appropriate the maximum thermal power, general design characteristics such as the engineered safety features of the nuclear installations included as safety measures against the hazardous consequences of postulated events and layout of the site.*
- 3. Source terms analysis representative of the overall potential hazards posed to the public (and environment) due to the range of technologies under consideration for nuclear installation(s) at the site, taking into consideration a representative scope of internal and external events enveloping all potential technologies of nuclear installation(s) considered for construction and operation on the site.*
- 4. A probabilistic risk assessment using the source terms referred to above as well as the site-specific environmental data, including meteorology, land use, population demographics and regional development, based on projections to account for the design life of the nuclear installation(s), to demonstrate compliance with the probabilistic risk limits. The cumulative impact of all nuclear installation(s) planned or existing must be taken into account in this analysis.*
- 5. Analysis of the impact on the public due to normal operations, anticipated operational occurrences and design-basis accidents of the nuclear installation(s) to demonstrate compliance with regulatory dose limits.*
- 6. Analysis to demonstrate the viability of an emergency plan taking into account the above factors, including transport and disaster management infrastructure.*
- 7. An assessment from the relevant national security authorities on the suitability of the site for establishing nuclear installation(s) from a security perspective.*
- 8. A programme to monitor all the site-specific characteristics and environmental data necessary for the SSR, including a programme of reporting to the NNR.*

Eskom is in the process of preparing SSRs for each of the three candidate sites and will submit the SSRs to the NNR in accordance with agreed timescales. The SSRs will contain all information as specified above, as well as any additional information that may be required by the NNR for the nuclear license application. In taking its decision about a proposed NPS, the

NNR will consider not only the SSR, but also other regulatory requirements for the assessment of the overall safety case.”

The above items simply reiterate our point that these factors will now be assessed without detailed public participation being undertaken – for this reason they should also have formed part of this EIA even if it means a duplication of time and effort, given that the highlighted items above are those of most critical concern to residents of the region where an NPS is proposed.

From pg 8 w.r.t. the study area:

*“At Bantamsklip, the community of Pearly Beach is situated at between 5.5 km and 6 km from the proposed site.”*

No mention is made of the Buffeljagsbaai fishing community, which is located to the east of the site and is even closer to the proposed site than Pearly Beach.

On pg 25 w.r.t. the conclusions and recommendations:

*“This report has outlined the methodologies that will be followed to quantify exposure of members of the community to ionising radiation. The approach considers site specific scenarios for multiple pathways of exposure. The quantified radiological doses will be assessed in terms of regulatory requirements of the NNR. The assessments for the candidate sites must demonstrate compliance with the NNR dose limits and dose constraints, and must also take into consideration the principles of ALARA. Should a calculated dose be within the acceptable NNR requirements and ALARA, it can be concluded that the cancer risk would be within the de minimis lifetime risk range. Protection against the development of radiogenic cancer is considered to be adequate for protection against hereditary effects and other radiation-associated diseases.”*

and

*“For purposes of the EIA, it is acknowledged that the NNR will issue a license for the establishment of an NNR at any particular site only if full compliance with the radiological dose limits and dose constraints is demonstrated, taking into account the principles of ALARA and all other matters relating to the overall safety case. Considering the methodologies for dose assessment that have been presented in this report, it is recommended that the approach be accepted as adequately protective against adverse health effects to members of the community.”*

Whilst the methodologies and extent of the multiple pathways of exposure that will be assessed cover the issues that are of prime concern to us as members of the public, the fact remains that we will not be in a position to study the data that will be presented to the NNR nor be able to comment and make submissions in this regard in the same way as is afforded in an EIA process such as this one. Whilst this report confidently states that if calculated doses are within acceptable NNR parameters there will be a *de minimis* lifetime risk range regarding the development of cancers, we neither have access to the relevant data to satisfy ourselves as to whether this contention is in fact true or not, nor do we have the opportunity to dispute, debate or make our own submissions in this regard based upon quantified, site-specific data within this current process. Again without such relevant data, this EIA simply cannot be seen as being a complete and thorough assessment of the potential environmental impacts of an NPS in the eyes of Joe Public. Given the enormity of the consequences of a development such as this one, even if there is a duplication of time and effort, this must be considered an acceptable cost in the interests of full disclosure, sound methodology, comprehensive public participation and confidence in the process.

## **RESPONSE (HUMAN HEALTH RISK ASSESSMENT)**

The following as reported in the EIA : “The small fishing community of Buffeljagsbaai is approximately 4.5 to 5 km from the site.”

The EIR contains only qualitative analysis. The report is based on a dose assessment, with qualitative interpretation of health risk. This is in line with the regulatory requirements as set out by the National Nuclear Regulator on safety standards and regulatory practices (R388) which is based on the accepted international system of radiation protection to ensure that public and the environment are not at risk from the effects of ionising radiation. Regulatory limits set by the National Nuclear Regulator are in line with recommendations from the International Commission of Radiological Protection (ICRP). The ICRP is an advisory body that offers its recommendations to regulators and advisory agencies, mainly by providing guidance on the fundamental principles on which radiological protection can be based.

.Quantitative dose analysis will be performed at a later stage through the NNR process.

### **YOUR COMMENT (EMERGENCY RESPONSE ASSESSMENT)**

#### **ANNEXURE E - EMERGENCY RESPONSE ASSESSMENT**

On pg ii of the Executive Summary and pg 4 of the report w.r.t. the limitations of the study, the following is noted:

*“However, the outcomes of the Safety Analyses, done prior to commissioning as part of Safety Analysis Report will determine if the current infrastructure would be adequate to cope with the demands of the additional and proposed Nuclear-1 Power Station.”*

and

*“The following are the limitations encountered in the current study which will be addressed in the Safety Analysis Report investigation to be done prior to commissioning of the plant:  
(i) **Safety analysis:** A comprehensive safety analysis of sources of potential exposure to evaluate radiation doses that could be received by the public as well as potential effects on the environment must be conducted. The safety analysis shall take into account potential accidents over a wide range of probabilities. The safety analysis must identify potential threats and determine the likelihood, nature and magnitude of the nuclear and radiological consequences.”*

It is rather alarming that a study to assess whether the current infrastructure is adequate to cope with the demands of a NPS, as well as an analysis to identify potential threats pertaining to radiation exposure will only be done prior to commissioning the plant. This approach is surely a case of putting the cart before the horse....? One would hope that these issues would be known, considered and addressed well before construction commences, rather than just before the plant is commissioned into use...?

On pg 5 of the report when discussing the location of the Bantamsklip site it is stated that agriculture is the primary activity in the Overberg. This is most certainly no longer the case – proof positive of this is the study undertaken by the Overstrand Municipality, which found that tourism (especially eco-tourism) are now the main economic drivers in their region.

On pg 7 w.r.t. land use, it must be noted that Buffeljagsbaai is to the east of the Bantamsklip site and not the NW.

Additionally, the conservation areas in fairly close proximity to the Bantamsklip site have not been made mention of at all – please refer to the map and attached comments on page 20 above in this regard. All of these sites are significant drawcards for the eco-tourism market, especially considering the relatively close proximity to the Cape metropole – attracting people from the local market as well as international visitors year-round.

On pg 26 w.r.t. the Conclusions pertaining to infrastructure:

*“The Bantamsklip and Thyspunt sites will require upgrading of the emergency planning infrastructure since they are remote areas as indicated by the Land Use Studies done by Eskom.”*

Besides the fact that the required infrastructure would need to be put in place at Bantamsklip, which is an additional impact that would result from the construction of a NPS, one must ask why the specialist has chosen to use Land Use Studies done by Eskom to make his assessment. This compromises the independence of the specialist’s assessment as far as we are concerned, and raises the question why the specialist did not make use of, or conduct his own, independent land-use study when compiling this report.

Also on pg 26 w.r.t. population densities, the following is stated:

*“In the course of the "selection" phase, during which a regional analysis is performed, sites in zones having the highest population densities are eliminated from the search; it is in effect reasonable, all other things being equal, to prefer sparsely populated zones to highly urbanised zones. In terms of the Site Safety Reports done for demography, the Thyspunt and Bantamsklip sites are satisfactory in this respect.”*

Given the fact that the emergency planning infrastructure would need to be upgraded at Bantamsklip, and that the population density in the Bantamsklip area is higher than either the Brazil or Schulpfontein sites along the West Coast, we submit that this further supports our contention that the Bantamsklip site should be removed from any future list of possible NPS sites.

The specialist repeatedly refers to *European Utility Requirements [EUR] for Light Water Reactor (LWR) Nuclear Power Plants* in his report. It is our understanding from the project description document that Nuclear 1 is going to be a Pressurised Water Reactor (PWR) which can either be a LWR or a Heavy Water Reactor (HWR). As we are unfamiliar with the exact difference in the science and specifications between these two types, the point we are trying to make may be moot, however if the requirements for LWR differ from HWR, then no consideration has been given to this difference in this report, as the specialist consistently refers to only LWR types.

## **RESPONSE (EMERGENCY RESPONSE ASSESSMENT)**

Any potential new site is assessed in respect of its feasibility of implementing an effective emergency plan. This assessment is done in terms of National Nuclear Regulator requirements long before (many years) commissioning takes place. Installation of emergency plan support facilities will have negligible additional environmental impact and will mainly form part of the nuclear installation infrastructure on site. Emergency planning zones required for the new generation nuclear reactors are significantly smaller when compared to the zones that currently exist for most operating nuclear power reactors in the world. The existing zones were established in the mid 1970’s and are as follows:

Precautionary Action Zone (PAZ) = 5 km  
Urgent Protective Action Planning Zone (UPZ) = 16 km  
Long Term Protective Action Planning Zone (LPZ) = 80 km

Eskom has committed to the following Emergency Planning Zones for new sites in South Africa:

PAZ = 0 km  
UPZ = 0.8 km  
LPZ = 40 km

These zone sizes are similar to the European Union requirements. The emergency plans for modern nuclear plant with their additional safety features are therefore less sensitive to the population density factor. These zones will apply to any reactor technology.

## **YOUR COMMENT (TRANSPORTATION ASSESSMENT)**

### **ANNEXURE E - TRANSPORTATION ASSESSMENT**

Per pg 1 of the Executive Summary:

***"Bantamsklip has a significant impact on the transport network, with upgrades required to the public transport system, heavy load routes and road upgrades required for emergency evacuation purposes. Due to the Bantamsklip site's isolated location, transporting heavy loads by road will require significant upgrades and the alternative transport by sea should be considered. A suitable site on the beach near to Bantamsklip will have to be identified and a landing with loading / off-loading facilities will have to be constructed."***

Given the extensive road and bridge infrastructure upgrades that would be necessary, plus the fact that the barging option would require the additional cost of an EIA, not to mention the construction of the necessary shore-based transfer facilities, plus the fact that the cost of construction of the high-voltage power line routes as estimated by Eskom for the Bantamsklip site is almost double that of the other two sites, must be seen as yet further reasons to remove the Bantamsklip property as a potential NPS site from any future project lists.

Under the Assumptions and Limitations of this report (pg 4) the following is noted:

*"Nuclear fuel delivery to Nuclear-1 will occur during the operational stage approximately 2 to 3 times a year as for Koeberg NPS. The fuel will be manufactured internationally and will enter South Africa via a major port and transported by road to the proposed Nuclear-1 site. Due to the infrequent annual fuel delivery consignments, the road transport impacts are expected to be negligible and are therefore not considered further in this study."*

Firstly, as a general comment, the carbon footprint associated with the international manufacture and importation of the fuel cannot be deemed as a positive, and makes nuclear power production far less environmentally friendly than we are led to believe by parties with vested interests in the nuclear industry. When one then adds in the enormous negative environmental impacts of the mining processes required before the fuel is manufactured, and then the actual construction of an NPS complex over an 8 – 10 year period, then the prospect looks even less inviting if the protection of our natural environment is truly the key issue. This before one even looks at the negative site-specific and regional implications of the long-term operation of an NPS and its ancillary activities...

That said, the fact that such lethal radioactive material would be transported by road to the Bantamsklip site, whether frequently or infrequently, cannot summarily be dismissed as having a negligible impact. Given the route that would have to be travelled for such deliveries to take place [through Cape Town, Somerset West, over Sir Lowry's Pass, and through towns like Hermanus, Caledon, Gansbaai, Napier, Bredasdorp (depending on the route taken)] and the high traffic volumes associated with the greater portion of these routes, this factor certainly deems closer assessment and analysis in our opinion.

Further, on pg 84, w.r.t the transport of low to medium level radioactive waste:

*“The transportation of radioactive waste is performed under the regulatory control of the National Nuclear Regulator and in accordance with international standards. Two to four shipments of low to medium-level radio active waste will be made each week.*

*It is proposed that the waste be transported via the N2 and N7 to Vaalputs as shown in **Figure 12.6**. Maud, Drennan and Partners conducted a preliminary investigation in 1988 with regard to the transport of nuclear waste from the Bantamsklip site to Vaalputs. The results of this study indicates that road transport is the most viable option. Radioactive waste will be required to be transported cross-country from the Western Cape to the Northern Cape.”*

Firstly, much has changed in the Overberg region since 1988 with regard to population densities and road usage along the various routes stemming from Bantamsklip, so the risk factor of radioactive exposure in the event of a road accident is now significantly higher. Secondly, in order to travel via the N2 and N7, not only will this transportation travel through centres like Gansbaai, Stanford, Hermanus, Caledon (possibly also Bredasdorp and Napier depending on the route) and Somerset West, it will also mean going over Sir Lowry’s Pass, which has a high accident rate at the best of times and is subject to extreme weather conditions. Has the effect of such regular low-level radioactive exposure on people living and working along the road routes been investigated and assessed? This is being asked in light of the Annexure B report attached hereto which states *“The results of the present study show that the radiation risk of chronic irradiation at low doses and low dose rates is higher than the radiation risk of acute irradiation. Therefore, the radiation risk of acute irradiation must not be used for assessment of possible health effects of chronic radiation because it causes significant underestimation of the expected effects.”* Whilst this issue relates primarily to the radioactive air emissions of an NPS, it seems logical that a similar effect could be experienced by the regular passage of radioactive material on our roads, which would normally not take place if an NPS were not to be built.

On pg 85 of the report w.r.t. the air routes impacts in the Bantamsklip area, with specific reference to the TFDC in the Bredasdorp area:

*“One of each aircraft type in use by the SA Air Force is stationed at this base. These include fighter aircraft and helicopters. Live missile firing and bomb testing from fully weapon loaded aircraft are conducted at this facility. This facility is also used by foreign countries for aircraft and weapons testing. Aircraft from these countries range from helicopters and fighter aircraft to very large tanking aircraft operating down to very low altitudes.*

*Exercises by local and foreign Air Forces and Navies are conducted in this area as well. A restricted area (FAR 147 - Ground level to 19 500 ft above mean sea level) has been declared for this reason. Bantamsklip is situated 13.4 NM (24.816 km) within this restricted area. Bantamsklip is also situated 15.508 NM (27.720 km) to the east of a Danger Area, FAD 143, which extends from Ground Level to 19 500 ft. above mean sea level. FAD 143 is used by the Navy as a training area, which includes the firing of live missiles and guns as well as the demolition of ammunitions. The range of the missiles onboard the new Frigate vessels of the SA Navy is  $\pm 43$  km, with a safe distance of  $\pm 50$  km. FAD 143 is also used for combined exercises by local and foreign Air Forces and Navies, which includes the firing of live ammunition.”*

Clearly the fact that training and testing of weapons and military sea- and aircraft takes place in close proximity to the Bantamsklip site makes this a high risk site in our opinion. ‘Training’ and ‘testing’ by definition imply a level of uncertainty and risk – adding an NPS into the mix should therefore not even be considered as a possibility as far as we are concerned. No matter what planning and controls are put into place, either at the military ranges or at the NPS, the potential for some type of disastrous event occurring is significantly higher simply by virtue of their close proximity to one another. This is further substantiation of our contention that the Bantamsklip site should never again be considered as a potential NPS site in the future, especially as none of the other sites under consideration need to contend with this type of circumstance.

Some of the transportation mitigation measures that the specialist recommends for the Bantamsklip site per pg 102 of the report, given as:

*“Construction phase:*

- Five hundred and seventy six temporary parking bays should be provided;*
- 38 minibus taxis and 24 buses should be provided to shuttle construction workers to the site;*
- Construction of the two access roads off the R43 to the Nuclear-1 site is required;*
- Due to the inaccessibility of the site for exceptionally heavy vehicles by road, a suitable site along the coast near the Bantamsklip site should be identified to allow loading and off-loading of the barge, which is proposed to transport heavy loads from Cape Town harbour to the site. A landing facility will be required to be constructed at an appropriate location; and*
- A comprehensive Construction Traffic Management Plan should be completed in conjunction with the relevant authorities before construction commences.*

*Operational phase:*

- The upgrading of the DR1206 to a surfaced road should be considered. The emergency evacuation plan should give guidance;*
- Nine hundred and forty five permanent parking bays should be provided;*
- A total of 30 minibus taxi and 4 bus trips per day should be provided to transport the Nuclear-1 staff;*
- A detailed emergency evacuation plan should be compiled for the Bantamsklip Nuclear-1 site; and*
- The Bantamsklip site requires the promulgation of a new Restricted / Danger / Prohibited area for the air space over the proposed NPS.”*

Such substantial increases in the road traffic volumes can only have the effect of ruining the sense of place of the area, increase air and noise pollution and will result in the very attraction of the area (the chance to experience and appreciate unique, tranquil and unspoiled nature) being ruined forever more.

## **RESPONSE (TRANSPORTATION ASSESSMENT)**

Your comments are noted. The author is reminded that the Bantamsklip has not been identified as the preferred site in terms of the Nuclear-1 EIA application for authorisation. It should further be noted that the application for authorisation has been made in terms of sites predetermined for the construction of the Nuclear-1 Power Station and it does not fall within the scope of this application to assess either alternative energy sources to nuclear power or the impact of mining on the environment.

### **Transport of radioactive waste and material**

The transportation of radio-active material will, for safety and security purposes not be transported via a set route. It will therefore be difficult to assess a particular route with respect to the transport of radio-active waste. GIBB is however determining the shortest route and a description of this route which will be incorporated in the revised Draft EIR

### **Increase in traffic and sense of place, air and noise pollution**

The Traffic, Noise and Social Impact Assessments recognises the impact on and have assessed the impact of increased traffic volumes on all sites and have proposed mitigation measures which are discussed in the specialist reports as well as Chapter 9 of the Revised Draft EIR. These mitigation measures have also been incorporated in the Draft Environmental Management Plane which is a legally binding document.

## **YOUR COMMENT (BOTANY & DUNE ECOLOGY IMPACT ASSESSMENT)**

### **ANNEXURE E - BOTANY & DUNE ECOLOGY IMPACT ASSESSMENT**

The sheer volume of information contained in this report showing the variety of terrain and consequent botanical diversity, as well as the numbers of red data species and endemics to the immediate area all proves the uniqueness and importance of this site. The footprint of an NPS could possibly be accommodated only with significant and costly mitigation measures being required, however the ultimate cost will come about through the cumulative risks and knock-on effects that such a development would have on the broader region –a fragile, unique natural asset that has been irrevocably changed and will no longer function as it currently does. It is quite clear that this site should be transferred to either SANParks or Cape Nature so that it can be included into the already extensive block of conservation areas in the area, so that this natural heritage can be preserved for future generations.

Per the conclusions on pgs 6-1 *“Where possible, powerline routes, and even access roads, should not cross the northern part of the site, given its high rarity, endemism and sensitivity”* and 6-3 of this extensive report *“With no mitigation none of the sites is deemed suitable for construction of a nuclear facility. If, however, stringent mitigation as discussed above is implemented, then all sites have potential for the construction of a NPS facility.”* As this means, in the case of Bantamsklip, *“a major amendment to the location and design of the NPS footprint”* we submit that these are yet further reasons for the exclusion of the Bantamsklip site for any future NPS development.

It is with some concern that we note that this specialist makes absolutely no mention in his report of the potential impacts of the radioactive airborne emissions of a NPS on the flora, given that these particles will be deposited on land and water in the area and as such will be taken up by plants. As exposure to radioactivity has been linked to changes in DNA and genetic mutations in humans (per pg 5 of the Human Health Risk Assessment report for this EIA *“Ionising radiation has sufficient energy to change the structure of molecules, including DNA, within the cells of the human body.”*) one must assume that the same potential exists in flora. In addition, the effect on the food chain due to radioactive material being taken up by plants should be considered, particularly as the case has been made that regular low-level radiation exposure is more harmful in the long term than large one-off radiation doses (see Annexure B document attached).

#### **RESPONSE (BOTANY & DUNE ECOLOGY IMPACT ASSESSMENT)**

We take note of your comments. Based on the experience at Koeberg, where radiological monitoring has been ongoing since before construction of the Koeberg Nuclear Power Station, radioactive emissions to plants is not regarded as a significant risk.

#### **YOUR COMMENT (TERRESTRIAL VERTEBRATE FAUNA IMPACT STUDY)**

#### **ANNEXURE E - TERRESTRIAL VERTEBRATE FAUNA IMPACT STUDY**

Similar to the botanical assessment, the sheer volume of information contained in this report, showing the variety of terrain and consequent faunal diversity, as well as the numbers of red data species and endemics to the area all proves the uniqueness and importance of this site.

With reference to the specialist's comments on pg 64 regarding the issue of radioactive emissions:

*“Accumulation of radioisotopes in the environment and in the bodies of wild animals was considered as a possible negative impact. However, available literature (e.g., Saint-Pierre & RPWG 2008) and expert opinion within the EIA team (W. Van Niekerk in lit.) indicate that the radiological protection specified by health and safety standards, and required for licensing of a nuclear facility, are such that a nuclear power station will pose no significant risk to wildlife in this regard.”*

We submit that this is a highly contentious and debateable issue, given that standards and specifications can potentially not be met, and that the risk of accidents (whether major or minor) does exist no matter what measures are put in place. Our comments above (w.r.t the floral report) pertaining to the effects on genetic material and the effects of such radiation emissions (in this instance via inhalation and ingestion) are also applicable here. Why expose our environment to such potential dangers, in addition to all the other negative impacts that are discussed by the various specialists in their EIA reports, when alternative, far less dangerous and invasive methods of power generation are possible?

Per pg 77 of this report w.r.t. the No Development option:

*“On the other hand, if Eskom were to dispose of the land and land use were to change to, for example, residential or resort, massive negative impacts could potentially occur.”*

Again, the contrasting positive potential, of dedicated and proper conservation management in the hands of public and/or private conservation organisations, must also be considered here – particularly in light of the already marked trend towards such land use for the purposes of eco-tourism, and the close proximity of numerous other conservation properties (see map on pg 20 above) in the area, not to mention the fact that Groot Hagelkraal is already a declared Private Nature Reserve and Natural Heritage Site.

*“While it is obvious that there will be significant negative impacts from development at Bantamsklip, the negative impacts of NPS development need to be weighed against the potential benefits of protection and management of the undeveloped portions of the Eskom-owned properties. The benefits could, potentially, outweigh the negative impacts of development, making the no-go option less desirable than the development option. However, such a positive outcome would depend largely on the degree to which recommended mitigations are implemented in the development plan and EMP.”*

As there is most certainly no guarantee that recommended mitigations would be implemented or sufficiently implemented, and the fact that an NPS development would forever ruin the sense of place of the entire area (irrespective of all the other negative impacts that it brings with it) it is difficult to see how potential proper management of the undeveloped portions of the Eskom property could ever be weighed up positively against the effect on the ‘bigger picture’.

Therefore, per the specialist’s recommended mitigation measures of the ‘no-go’ option being (per pg 114 of the report) as follows:

- *Maintain Eskom ownership of the land. This and other recommendations assume that the site is not chosen for Nuclear-1, but that it will be retained as an option for Nuclear-2 or 3.*
- *Declare the land a private nature reserve, and enter into a stewardship agreement with CapeNature.*
- *Institute a programme to reduce and control the spread of invasive alien vegetation.*
- *Improve access control to the site, especially by vehicles.*
- *Commission additional detailed surveys of cryptic fauna on site.*

We cannot support item 1, as it is clear from the numerous specialists’ reports in this EIA that the Bantamsklip site should be preserved and conserved as-is in perpetuity and should thus never again be considered as a potential NPS or other type of development site. We would wholeheartedly support items 2 – 5 above particularly the incorporation of this property together with neighbouring properties into the Agulhas National Park.

## **RESPONSE (TERRESTRIAL VERTEBRATE FAUNA IMPACT STUDY)**

We take note of your comments. The Vertebrate Assessment has been revised and is available for comment and review as part of the Revised Draft EIR.

## **YOUR COMMENT (INVERTEBRATE FAUNAL ASSESSMENT)**

### **ANNEXURE E - INVERTEBRATE FAUNAL ASSESSMENT**

Taking into consideration the following extracts from the Conclusions and Recommendations of this report on pg 85:

*“Confirmation that the surveys to date have not been sufficiently detailed comes from the fact that on both occasions that general invertebrate surveys have been carried out, specimens of new, potentially new and/or rare species not previously recorded have been found at each of the sites, despite these visits having been very brief and the surveys relatively superficial. There is clearly much that is not known about the invertebrate fauna of these sites. Given the patchy distributions, apparently not linked to observable patterns of vegetation or soil type, of some of these important species, far more comprehensive surveys are clearly required to provide detailed sensitivity assessments.”*

and

*“If Bantamsklip is selected for NPS construction the status of the Almeida Copper Butterfly population at Bantamsklip should be investigated. In this instance the surveys should also include a component specifically aimed at finding male specimens of the probably undescribed trapdoor spider species (*Spiroctenus* sp.) found at Bantamsklip so that its status can be verified, as well as surveys of its distribution on and around the Bantamsklip site to aid in confirming preferred locations for NPS development and ensuring the conservation of the species.”*

and on pg 86:

*“Thus from the perspective of the terrestrial invertebrate groups investigated, development at the Duynefontein site would have the least negative impact and at Bantamsklip the most.”*

and finally on pgs 48 and 87, at last a specialist who is prepared to consider the possibility of a worst-case scenario:

*“The operation of a nuclear power plant utilising currently available technology inevitably leads to the emission of at least small amounts of radioactive material into the atmosphere, with a risk that this may result in accumulation of radioisotopes in the surrounding environment and the organisms inhabiting it. While the risk appears to be extremely small and easily managed judging by the historical data from Koeberg, it still needs to be considered, especially in the light of potential cumulative impacts of having as many as three (or even five in the case of Duynefontein) nuclear power stations at one site.*

*Assessment of the risk of a serious accident resulting in the release of substantial amounts of radioactivity is beyond the scope of this study; however it is understood that the designs of the reactors under consideration by Eskom are such that even in the extremely improbable (theoretically impossible) event of a reactor meltdown, all radioactivity would be contained and no release into the environment would occur.”*

*“It should however be borne in mind that the above assessment is based on the assumption that a nuclear accident resulting in significant radioactive contamination of the environment will never occur. The risk of potentially disastrous negative impacts on the surrounding invertebrate communities would need to be balanced against the positive impacts described above.”*

We submit that this report on its own indicates a) why Bantamsklip should never be developed in the future and should rather be formally and properly conserved considering the potential for new and/or rare species being identified, and b) that the issue of accumulated radioisotopes is indeed an

important factor especially in light of the potential for multiple NPS units being constructed on the site in the future.

When combined with the results of all the other specialists' reports, the incredible biodiversity that will be affected and put at risk is patently obvious. Add then also the extent of mitigation measures that would be required by each field of study in order to make the development of an NPS more acceptable, not to mention the cost of such measures and the fact that a portion of our natural heritage will be lost forever no matter what mitigation measures are applied, the conclusion that one must reach is that it simply is not acceptable to propose that an NPS be built at Bantamsklip.

This specialist's (and others) reliance and acceptance of only Eskom provided information regarding radioisotopes and Koeberg data cannot be viewed as objective and independent (a point also made by Mr Mike Kantey's submission regarding the Human Health Impact Assessment report, and highlighted by seeming discrepancies in data that he has to hand), especially where assessments of impacts need to be made based on such information. We submit that verifiable and **independent** data accumulated internationally since the inception of nuclear power generation technology should additionally be considered before reasonably confident deductions can be made regarding such cumulative impacts.

With regard to the 'no go' option, our previous comments regarding the conservation of the site by Eskom vs a change of ownership which could conserve the entire site and region also apply to this specialist report. Whilst Eskom may have a good track-record with regard to conservation policies on its properties, it is ultimately not Eskom's job to be a conservation body. That said, it would behave Eskom to consider making any sale of such properties subject to strict conservation-oriented terms and conditions so as to further minimise the potential mismanagement and misuse in the future.

#### **RESPONSE (INVERTEBRATE FAUNAL ASSESSMENT)**

We take note of your comments regarding invertebrate biodiversity. The Faunal Assessment had been revised and is available for review as part of the Revised Draft EIR.

Source monitoring data on radioisotopes has been made available publicly. The claimed discrepancies identified by Mr Kantey have been examined and found not to warrant any further investigation. These data are examined by the NNR and their veracity has never been questioned.

#### **YOUR COMMENT (MARINE ECOLOGY STUDY)**

##### **ANNEXURE E - MARINE ECOLOGY STUDY**

Per pg 8 w.r.t. the benthic environment at Bantamsklip:

*"While the benthic environment as a whole demonstrates medium tolerance to disturbance (and hence medium sensitivity), the abalone population is considered highly sensitive."*

The presence of a highly sensitive abalone population in addition to all the other rare, endemic and or threatened fauna and flora highlighted by other specialists, simply adds to our conviction that the Bantamsklip site is unsuitable for any type of industrial or nuclear development of any kind, and should rather be formally conserved in perpetuity.

*"Although no site-specific study of sandy bottom community composition has been undertaken, no species of special conservation importance (besides the abalone) are known from the area."*

Given that an admittedly hasty and superficial study of invertebrate fauna resulted in possibly two new species being discovered, it is possible that the same may be true for the marine environment in this area. It is therefore alarming to read that a specialist, who has been tasked with making a detailed

study of a site in order to assess the potential impacts of a development, did not see fit to make a site-specific study of a community composition, and relies simply on what is currently known. How can we then be confident that a definitive assessment has in fact been made?

Per pgs 17 and 18 w.r.t. desalination:

*“Typical pre-treatment of seawater required for the desalination process includes the use of both chlorination and dechlorination, the addition of anti-scalant agents and surfactants, and the adjustment of pH through the addition of strong acids. The end result is purified water and a highly saline effluent, which could contain a variety of chemicals including sodium hypochlorite, ferric chlorite, sulphuric or hydrochloric acid and odium hexamethaphosphate. It is important to note that the chemicals in the release water are approved by the United States Environmental Protection Agency for use in drinking water systems, at similar concentrations as those found in desalination effluent (Einav et al. 2002). This effluent will be released into the ocean.”*

Frankly it is rather irrelevant what the USEPA approves regarding the chemical content and concentrations – the fact of the matter is we are dealing with a marine environment at Bantamsklip that currently is not overburdened by pollutants, and should be maintained and preserved as such.

*“When released independently, the impacts of hypersaline effluent are focused on benthic communities, as brine has a higher density than seawater and thus settles on the sea bottom, where dispersion is limited (Einav et al. 2002). Under such conditions any impacts on benthic biodiversity are likely to be focused around the release site. However, as the brine will be released into the surf zone during the construction phase, physical mixing with surrounding sea water will result in dilution to 1 g/L above ambient salinity within 110 m from the point of release (Prestedge et al. 2008). Any ecological impacts will be focused within the water column due to the high energy of the surf zone.”*

Whilst the above leads us to believe that **all** the brine will be dispersed by the wave action, logic dictates that if it will take 110m to dilute the effluent to a point where it is still above the normal saline concentration of the sea, the brine will still have the tendency, within that 110m, to settle on the sea bottom by virtue of its higher density, and thus not be so effectively dispersed. Additionally, if one assumes that the sea bottom slopes away from the shore fairly consistently, the combined effect of gravity and saline density will surely mean that the effect of the high concentration of salinity could be spread further out to sea on the sea bottom than the range given above, and will also take longer to dilute due to the fact that dispersion at sea bottom is limited – especially once it has sunk outside the active surf zone. Therefore, saying that the ecological impacts will be focussed within the water column could possibly not be quite so localised.

*“...the South African Water Quality Guidelines for Coastal Marine Waters states a target range of 33 ppt to 36 ppt for salinity of effluents entering the sea (Department of Water Affairs and Forestry 1995). These guidelines will be met by this development during the operational phase. Although they will not be met during the construction phase, dilution will occur within 110 m of the point of release.”*

Firstly, we have a problem with the fact that a set of guidelines, as issued by a government department, are glibly and simply not going to be met during the construction phase. Secondly, when considering the fact that the construction phase of an NPS can take from 7 – 10 years, one cannot help but get the feeling that the true extent of this impact has been somewhat glossed over. Particularly as no actual quantification of how much brine will be released is given in this report – however, we are given some indication of the extent of the impact by the Fresh Water Supply Assessment, where on pg iv of the report one finds the following:

*“• Brine produced as a by-product of the desalination process must be discharged in the surf zone during the construction phase (up to 156 L/s) to facilitate mixing;”*

Clearly this is going to be a significant impact over many years – even if the effects thereof are considered to be fairly localised, it is one of many impacts which, when they are all assessed cumulatively, simply will be very difficult to mitigate completely.

Per pg 23 w.r.t. radiation emissions:

*“...the most likely pathway for the release of radiation into the marine environment is through the release of contaminated cooling water.”*

and

*“In particular, radionuclide levels should be monitored in the abalone *H. midae* due to the extremely high commercial value of, and demand for, this species.*

*This impact has the potential to affect the marine environment throughout the operational phase.*

*In the unlikely event of a nuclear accident affecting the marine environment, mortalities will be focused in the general area of the power station. Highly mobile species, such as fish or sharks, exposed to low to intermediate levels of radiation may, however, move great distances. This could pose a threat to public health if these fish were later consumed.”*

Apart from the release of cooling water and the nuclear accident scenario, the specialist fails to consider the effect of the regular airborne radioactive emissions that take place during the operation of an NPS, which will affect the marine environment in the same way that the dispersal of such particles will have on the fresh water (surface and ground) as referred to by the hydrological specialists. Additionally, in light of the Annexure B report regarding the higher risk associated with regular low-level radiation exposure, this makes the above statements regarding the highly mobile fish species and the abalone even more worrying.

Regarding the closure of the site to counteract exploitation of marine resources such as abalone, whilst an Eskom development might impose an exclusion zone, the same is possible under a dedicated conservation organisation in co-operation with various law-enforcement agencies – this potential positive impact is thus certainly not the exclusive ambit of Eskom.

Per pg 17 w.r.t. the release of sewage effluent:

*“During the construction and operational phases a sewage waste water treatment plant will treat 750m<sup>3</sup> of water per day on site. Following treatment this effluent will be discharged into the ocean via the cooling water outfall tunnels. As required by the Department of Water Affairs and Forestry this water will meet the required standards as set out in the South African Water Quality Guidelines for Coastal Marine Waters at the point of release. As such no impact on the marine environment is anticipated.”*

As the cooling water outfall tunnels will only be constructed during the construction phase, how will the effluent be discharged into the ocean so that it does not affect the surf zone until such time as the tunnels are built? And how long will it take to construct these tunnels? Whilst it is hoped that the water quality guidelines will be met the fact remains that sewage and the chemicals used to treat it will be disposed of into a local marine environment that currently is not being over taxed with such substances.

Per pg 19 w.r.t. contaminated ground water:

*“During the construction and operational phases potential pollution of groundwater and the subsequent contamination of the marine environment may originate from leaks and spillages from both on-site sanitation facilities as well as from fuel, oil and grease storage facilities.”*

and

*“Such pollution has been demonstrated to dramatically affect organisms in both intertidal and benthic habitats with recovery only occurring after a number of years in some cases (Lu and Wu 2006). Again the dynamic nature of the recipient nearshore environment is likely to aid in the dilution and dissipation of any contaminants.”*

and per pg 29 w.r.t. the effect of construction of intake/outflow channels:

*“Disruption to marine habitats will definitely occur during the construction phase and this impact is rated as having high significance.”*

and pg 20 w.r.t. the disposal of spoil into the ocean:

*“Additionally, the benthic habitat is at risk due to potential discarding of 10.07 million m<sup>3</sup> spoil from the excavation of the intake tunnel, intake basin, nuclear island and turbine hall.”*

and

*“As no major currents flow in this region, oceanographic modelling indicated that within the first five years following disposal the sediment is likely to spread to cover an area of between 6 km<sup>2</sup> (Alternative 4) and 3.5 km<sup>2</sup> (Alternative 6) in more than 10 cm of sediment. Importantly as much as 32 % and 40 % of this covering of sand is expected to be between 5 cm and 10 cm deep. Due to the slow moving nature of this sediment and the lack of organic content, this sediment is expected to be colonised by sandy bottom species and support communities similar to those of surrounding undisturbed areas.*

If up to 6km<sup>2</sup> will be under more than 10cm of spoil, what is the total area that will be affected by spoil where a thickness of less than 10cm is included? We are also not given any indication of how long it will take for this spoil to be recolonised by the specialist.

and pg 30 w.r.t the disposal of spoil into the ocean:

*“This impact will negatively affect the marine environment. Due to the high intensity of this impact and long term effects resulting from the discarding of spoil on the benthic habitat this impact is rated as having high consequence and high significance.”*

Given that even with mitigation this impact is considered to be of medium consequence, and the fact that the storage and/or disposal of spoil on land at the Bantamsklip site is also problematic in light of the various flora and fauna specialists' reports, we submit that this is yet another reason to discount Bantamsklip as a possible future NPS site.

Per pg 21 w.r.t. the abstraction of cooling water and subsequent entrainment of organisms at Bantamsklip:

*“Although the impacts of cooling water abstraction and the resulting impacts on plankton have not been quantified for this site, as they have been for Duynefontein, the Koeberg experience does still offer useful insight into possible effects. Nonetheless it should be noted that the effect of chlorination is likely to be more important at this site, as the toxicity of chlorine will be elevated by higher ambient sea temperatures (Huggett and Cook 1991) (maximum sea surface temperature for this site is 21.3°C compared to 19°C at Duynefontein (Shillington 2007).”*

Whilst the issue of lack of actual quantification again raises its head here, making any assessment in fact purely speculative, an additional concern is that a 4000MW plant is more than double the size of Koeberg. This therefore makes it even more important that such impacts be properly quantified, and this EIA report cannot be considered as being complete without the ramifications of this (and numerous other items which lack proper quantification, as has been seen throughout the DEIR) having been properly considered.

Given that our oceans world-wide are already under enormous pressure in dealing with human-generated waste of all types, the thought that one of our own fairly unspoiled marine environments could potentially be subjected to such bulk abuse (brine, warm water, spoil, effluents, chemicals and contaminants of various kinds) is nothing short of tragic.

## **RESPONSE (MARINE ECOLOGY STUDY)**

### **The benthic environment at Bantamsklip**

- Unlike the situation with terrestrial invertebrates, and indeed land plants, many of which are very limited in distribution, most marine species are widespread broadcast spawners and have distributional ranges measured in the 100's of km. The distributional patterns of the invertebrate fauna of coastal seas around South Africa has also been the subject of numerous previous studies. Given this, a full-scale ecological survey of marine ecosystems surrounding Bantamsklip was not deemed necessary, as the eco-region within which this site is situated is well studied and relatively uniform. Current knowledge thus enabled an adequate assessment of impacts associated with the proposed development in respect to the range of species present.

### **The release of brine**

- The detailed modeling which considered the fate of the release of brine in the marine environment took into account all oceanographic features which would affect the dispersal of the effluent (Please see Prestedge et al. 2008 for details). This detailed study predicted that physical mixing with surrounding sea water will result in dilution to 1 g/L above ambient salinity within 110 m from the point of release. This is thus an extremely limited impact in spatial terms.
- We agree that negative impacts will occur as a result of the release of brine during the construction phase. This has been taken into account in the assessment of this impact and is reflected in this impact being rated as having high significance (the highest rating possible).

### **Radiation emissions**

- The emission of significant radioactive materials into the marine environment surrounding the station is considered to be a very low risk scenario, but as a precautionary approach we felt its implications should be mentioned (hence the wordings such as 'potential' and 'highly unlikely' in the main text). Given the fact that the cooling water never comes into contact with the reactor core, release of contaminated cooling water is virtually totally precluded by the design of the plant. Any minimal air release would be expected to have much less impact on the sea than any minimal land scenario. This is because on the land particles lie on the surface, while in the sea they are mixed into the volume of the water, which is in constant motion, leading to rapid dilution.

### **Exclusion zone**

- We agree that theoretically it is possible for a conservation group and law enforcement agencies to protect an area from poaching, but must point out that recent history has proven this to be practically very difficult. Despite huge effort, police have not been able to halt illegal

operations in the area and it is unlikely that they would be able to dedicate 24 hour surveillance to a particular area, as would be mandatory for Eskom to do.

#### **Sewage effluent**

- It is our understanding that at no time will sewage effluent be discharged at levels above those laid out by the SA Water Quality Guidelines. As such there will be no additional impact on the marine environment (remembering that the persons concerned will be generating sewage that is disposed of under the same guidelines wherever they live!).

#### **Contaminated groundwater, construction of inflow/outflow channels.**

- Although sections from the report have been highlighted, no comments have been made by TAG that require a response.

#### **Disposal of spoil**

- The comment is noted. It is considered that deposition of a layer of sand of less than 10cm over an existing sandy bottom will have little impact, as this scale of sand mobility is within the range of natural events. Also most soft bottom dwelling benthic species are mobile burrowers that will simply burrow upwards through this additional layer. Most benthic invertebrates have life-spans of one to a few years, so this is considered to be a measure of likely recovery time (as has been experimentally demonstrated following marine diamond mining on the west coast)

#### **Abstraction of cooling water**

- The work conducted at Koeberg is the only equivalent South African study and it would be foolish not to consider its findings. It is also important to note that due to its location on the south coast Bantamsklip is situated in an area which supports much lower plankton production than Koeberg (situated on the highly productive west coast). As such, impacts on plankton associated with chlorination are not expected to be significant and while quantification of such impacts is of interest, we do not feel that it is a prerequisite for making a sound assessment of the overall impacts of the development under consideration, as it is certainly a minor disturbance.

#### **YOUR COMMENT (OCEANOGRAPHIC SPECIALIST STUDY)**

#### **ANNEXURE E - OCEANOGRAPHIC SPECIALIST STUDY**

Per pg 4 under assumptions and limitations:

*“Cooling water discharge may contain co-discharges such as chlorine. These codischarges have not yet been quantified and therefore an assessment of the significance of impacts associated with co-discharges is not possible until concentrations of each parameter in the discharge are known. Increased levels of codischarges are not expected to affect the operation of the NPS, they may however have an impact on the marine ecology depending on the type and concentration of the co-discharge. The ecological sensitivity of the receiving marine environment to these discharges is discussed further in the Marine Ecology Specialist Study.”*

And page 7 w.r.t. local tsunamis:

*“Offshore slump generated tsunamis are considered as the largest unknown risk factor for the South African coast (PRDW 2009a). A number of slump regions have been documented where historical slumping has occurred on massive scales in various phases including late Mesozoic (148 million years ago - 65 million years ago), early to late Tertiary (65 Ma - 1.8 Ma) and possibly Quaternary (1.8 Ma-present). However, a quantitative assessment of the risk of occurrence and geometry of future slump events along the South African shelf margin is not available at present.”*

This once again begs the question “How can an accurate impact assessment be made without the necessary and accurate data?” Quite simply, it cannot.

On pg 8 of the report, w.r.t. climate change effects, we again note that the specialist has chosen to make use of the more conservative estimation of 0.8m in sea level rise, rather than the extreme upper limit data of a 2m prediction in sea level rise – refer to our comments on pg 18 above (1 in 100 year floodline assessment) in this regard.

When seen in conjunction with the following per pg 34 of this report:

*“The extreme high and low water levels predicted for the Bantamsklip site are seen to occur during a meteo-tsunami event (i.e. extreme meteorological conditions in combination with maximum probable tsunami run-up and run-down values). Taking into account the effects of climate change upon sea level rise, the maximum water level under these conditions is predicted to be 11.03 m MSL (at the upper 95% confidence limit). Due to the site being constructed at 10 m MSL there is the potential for the flooding, although the probability of such an occurrence is statistically low.*

*The maximum meteorological extreme high water levels are 7.46 m over a 1:100 year return period.”*

Whilst the statistical probability is low of such an occurrence, it must be catered for in the design and siting of an NPS, especially as the extreme upper limit data of predicted sea level rise has **not** been employed in these calculations – there is therefore an even greater potential for flooding, and a consequently higher negative impact significance rating. We therefore support the specialist’s advisory on pg 42 that such data be considered when designing the NPS, however we would have preferred to see the actual results of calculations using the extreme upper limit data being incorporated in this report.

General note: Figures 2-7, 2-8 & 2-9 (amongst others) were referred to but not included in the report, and the annexures to this report were too large to download from the Arcus Gibb website, to check if these figures were presented in these.

On pg 25, the issue of the sediment plume resulting from the disposal of spoil into the ocean is noted as being:

*“A sediment plume may be visible at concentrations as low as 10 mg/l. Maximum concentrations predicted at Dyer Island generally exceed this threshold suggesting that the plume may be visible during the disposal operation.”*

We acknowledge that various factors influence the dispersal of the sediment plume however, given that the maximum concentrations of sediment suspension (per pg 33) could range from 9mg/l to 35mg/l from near surface to near seabed, we submit that this impact **will** be visible, rather than ‘may be’ visible.

Besides the impact on the marine ecology of the area of such disposal of spoil, the specialist's acknowledgement on pg 37 "*However, the potential for suspended sediment plumes to impact upon tourism (in particular shark cage diving at Dyer Island) should be considered if Bantamsklip is selected.*" is of vital importance and cannot be emphasised enough. Tourism is a key industry in the region, and any negative impact of a proposed NPS should be considered a disqualifier of the Bantamsklip site.

W.r.t. the thermal plume dispersion at Bantamsklip on pg 34:

*"The mean temperature increase in seawater temperature near the surface resulting from both outfalls is an area approximately 700 m in diameter 1 - 2°C higher than ambient. The maximum temperature near the surface is shown by a very small 5-6°C contour indicating that a high level of initial dilution is achieved at this site. However, as with the near seabed contour, the maximum temperature increase mixing zone appears to be forced towards the shallower nearshore waters where the impacts upon marine ecology are potentially greater. Although the mixing zone has a relatively small extent the fact that it impinges upon the shallow near shore waters and shoreline results in a potential for low negative significance."*

However the Marine Ecology assessment indicates on pg 21:

*"It should be noted that no thermal tolerance has been established for gametes and larvae of this species (i.e. abalone). While *H. midae* occur to depths of 23 m (Newman 1969), along this section of coast approximately 80% of the population occurs in the 0-5 m depth range (Tarr 1993). The above adult distribution, combined with the fact that the degree of larval dispersal is thought to be fairly limited as spawned ova stay in suspension for only a few minutes and *H. midae* has a short planktonic larval stage (Genade 1988), temperature changes in the depth range of 0-5 m are of greatest concern."*

and on pg 30:

*"The release of heated cooling water is expected to affect the marine environment within a contained area, although over the long term. The intensity of the impact is rated as medium, due to affects on local abalone populations. As such this impact is considered to be of medium consequence and high significance."*

It is therefore clear that the warmer water will tend to be nearer the surface and be pushed inshore – given that the impact on the reproduction phase of the highly sensitive abalone has not been sufficiently assessed, and that such reproduction occurs in just this shallower in-shore region, clearly a lot more work needs to be done in order to have a truly accurate assessment of the impact of the warmer water resulting from the operation of an NPS. Given that the current assessment indicates a medium impact, we submit that the potential exists for this impact to be rated even higher once the thermal tolerances of gametes and larvae of the abalone in this region have been established.

This specialist has given no suitability rating, in order of preference, of the three potential NPS sites based on the findings of the report.

Another general comment: it is notable that the only reference used by this specialist regarding the technical description if an NPS is one issued by Eskom, sourced from AREVA.

## **RESPONSE (OCEANOGRAPHIC SPECIALIST STUDY)**

### **Plume Visibility**

The visibility of the sediment plume is not only dependant on the dispersion of sediment but also the position of the person observing the plume. Both spoil disposal sites are situated a fair distance offshore and therefore the visibility of the plume to a person standing on the shoreline will depend on a number of factors including the observer's position, elevation, ambient light levels etc. Hence the report uses the word 'may' rather than 'will'.

### **Assumptions and Limitations**

The effect of a tsunami on extreme sea levels was calculated using the best available data at present.

The codischarges are not expected to affect the operation of the NPS. They may, however, have an impact on the marine ecology, depending on the type and concentration of the co-discharge.

## **YOUR COMMENT (SOCIAL IMPACT ASSESSMENT)**

### **ANNEXURE E - SOCIAL IMPACT ASSESSMENT**

Regarding the accommodation of staff and construction workers, per pgs 26 -27, the numbers of staff (8737) and the consequent accommodation and other facilities required, the extent of land required for this (291.1 hectares) and the astronomical cost associated with this (in the case of Bantamsklip - R107 004.83 billion) indicates just how significant the impact of an NPS will be on the area. This is supported by the specialist's own assessment, per pg 142 w.r.t. Bantamsklip and Thyspunt:

*"Without mitigation measures, it is anticipated that the scale of this impact will be local, the extent negative and the intensity high. This impact is definite, of medium-term duration, medium reversibility, of high consequence and significance."*

And on pg 143

*"If mitigation measures are successfully implemented then the significance of the impact should revert to medium."*

We must contest the specialist's assessment regarding "irreplaceable", however, as the staff accommodation and facilities resulting from the construction and operation of a NPS, together with the actual NPS itself, and the numbers of people and vehicles attached thereto will forever impact on the single most valuable resource that this region has – the unspoiled sense of place which is irreplaceable.

This aspect of the project cannot be assessed in a separate EIA, and must form part of this EIA process, as it is a direct consequence of the project and as such is a cumulative contributor to the effects on the environment.

Per pg 82, w.r.t. local tourists:

*"Furthermore, in the long term, a NPS may limit the development of the regional tourism destination as an eco-tourism destination, with tourism opportunities being limited in the immediate vicinity of a NPS."*

Frankly there is no 'may' regarding the potential effect of an NPS on eco-tourism in the region, but a very definite 'will', and these limitations will most certainly not be restricted to the immediate vicinity of the NPS, but will be felt regionally.

Also per pg 82 w.r.t. international tourists"

*"Approximately 500 international tourists per year and up to 500 in season, visit the Stanford area. The estimate at any given time is 1000 per year and up to 1500 international tourists per season. The peak international tourist season ranges from October to February."*

Firstly, we must query the accuracy of the statistics mentioned, and whether these are current or not. Secondly, why are only international tourists in the Stanford area noted when a large percentage of international tourists to the area will originate from centres like Cape Town, Hermanus, Agulhas and surrounding areas in the form of day trippers (i.e. not necessarily spending bed-nights in the immediate area)?

We feel that this quantification may therefore be fairly skewed.

Whilst the specialist acknowledges the shortcomings of using the census figures of 2001 as a basis for assessment, we would like to emphasise that this is indeed a significant limiter to making accurate evaluations about the Overstrand region, as much has changed since 2001, not only in population densities but also with regard to land-use and the regional trend towards eco-tourism especially. As this is the case, the evaluation of the following factors are subject to some review, and cannot be accurately assessed until a new census has been done: age structure, education, household income, industry, mode of transport, occupation, personal income, population groups, work status, tenure status and employment status.

Per pg 94, regarding correctional facilities in the Overberg, no mention is made of what the maximum capacity of the facilities are and whether these facilities would need to be expanded in order to cater for the influx of people into the area and the concomitant increase in crime of all types as a result of the NPS.

On pg 96 & 97, w.r.t. land use patterns, absolutely no mention is made of the extensive conservation focussed use of land in the area – again see pg 20 above in this regard.

The specialist however does acknowledge the importance of the eco-tourism sector to the region on pg 98 *"The natural assets of the area (in terms of eco-tourism) are its single biggest asset, but the natural resource base may also limit growth if resources are not effectively managed. The Overstrand economy and its ecology are inseparable."* as well as on pgs 99-100.

Per pg 98 w.r.t. fishing:

*"The impact of an exclusion zone on communities will be experienced more at Bantamsklip than at Thyspunt or Duynefontein. This is due to the fact that the communities at Kleinbaai and Buffeljagsbaai are heavily dependent on fishing;"*

The fact that Buffeljagsbaai is about 4km from the Bantamsklip site and is heavily dependant on fishing not only raises the question of how this community will survive, but also puts at risk the historical and cultural heritage of this community and its traditional way of life. Here factors like, for example, the human health issues of the radioactive emissions during the operational phase of the NPS, and the social effects on this unique little community through exposure to large numbers of migrant workers, are essential in the consideration of Bantamsklip as a potential NPS site – or will the Buffeljagsbaai community become the new Skipskop, and be summarily removed?

Per pg 105 w.r.t. emergency evacuation at Bantamsklip:

*“If an emergency evacuation is required, it is expected that a total of 8 500 construction workers would have to be evacuated utilizing approximately one hundred and thirty (130), 65 seater busses within four hours.*

*During the operational phase, the 3 000 staff members would be evacuated using approximately 1 000 vehicles. Using a vehicle occupancy of 1,5 persons per vehicle the 20 000 people within the 16 km UPZ would possible evacuate using 13 400 vehicles. Therefore 14 400 vehicles would be required to be evacuated within 16 hours.”*

Not only are these figures alarming, it simply reinforces the doubt that one has regarding the appropriateness of such a NPS – not only for this region, that will have gear up in order to be able to deal with an emergency evacuation, but also due to the mere fact that such a contingency needs to be catered for at all. We reiterate our view that there are quicker, cheaper, more sustainable (from a resource and employment point of view) renewable methods of energy production that can be implemented on a regional basis, and which do not have the life-threatening potential of a NPS.

Per pg 145 w.r.t. the influx of job seekers:

*“The combination of the construction and other workers on the development, and unsuccessful job seekers, could increase the number of new residents to the area to a level that could threaten the existing social and community life in the area. The towns of Pearly Beach and Gansbaai may experience a total change in the way people live their lives. The rural relaxed lifestyle of many people could be threatened.”*

We submit that the above highlighted effects will be the overall negative result of the NPS development as a whole, on the area and the region, together with the loss of sense of place and its niche as an eco-tourism destination.

Regarding the creation of job opportunities as a result of the construction of a NPS, the overall positive effect assessed by the specialist (including the knock-on benefits for other types of work and business opportunities in the region) are indeed valid for the 10 years of the construction phase. This has been given a rating of high positive significance. But what about after the construction phase, when everything is built and up & running? Where to then for the average worker in the construction industry? This impact has been rated as having medium negative significance. When linked to the business opportunities that the construction phase would bring with it, rated as medium positive, the loss of spending power of those that will be out of work after the 10 year construction period must surely also impact on such businesses. Fair to say then that the net effect of the NPS on job creation, once it is in operation, will in actual fact not be very positive at all.

Given that the crime rates are likely to go up, that the road and transport infrastructure will need to be upgraded, that the water supply in the area will be inadequate for the influx of people, waste management will need to be addressed as this will stem from the NPS as well as the accommodation/recreation facilities, the negative visual impact of the NPS as well as the concomitant accommodation and other facilities, the loss of sense of place due to the development and its ancillary infrastructure, the additional strain placed on services and facilities such as law enforcement, schools and medical facilities – all of which are negative implications (which may or may not be improved by mitigation measures, these in themselves not being guaranteed) as assessed by the specialist – can lead only to one conclusion: Bantamsklip is not an appropriate site for an NPS, ever.

Correction – only one hospital in Caledon, not two as per pg 184.

Given the specialist’s own description of the future land use in the Bantamsklip area on pg 200, with particular emphasis on the growing wine industry and the trend towards large scale conservation projects, we fail to see how the NPS can have a positive impact of medium consequence on these

trends – no-one wants to come to a region to relax, be in a rural, natural setting and view a NPS and its associated infrastructure marring the environment...!

Regarding the perceived risks of nuclear incidents – whilst the specialist's comments regarding the various aspects of this factor raise some valid points, the fact of the matter remains that:

- much of the data regarding the effects of radioactive exposure on the surrounding environment due to the regular radioactive emissions resulting from operation, specifically w.r.t. the ingestion of foodstuffs, is not made available to the public – lack of disclosure immediately raises concerns i.e. what are they hiding?;
- a nuclear power station has the potential to cause serious and lasting harm to the environment if subjected to terrorist attack, mismanagement or there is an operational and/or design failure which causes accidental radioactive leakage or a melt-down;
- an emergency evacuation plan is necessary for such an installation (if its so safe, why is this then necessary?);
- skills development and training in the renewable energy industry is just as possible as for a NPS (and also more sustainable and of a larger extent – refer to the first article in Annexure A);
- design safety of the newer nuclear technology is questionable due to the fact that much of it is not yet operational anywhere in the world, and as such is untested. One's fears are also hardly allayed when articles such as Annexure C indicate that there are design flaws in this supposedly safe new technology;
- communication from those with vested interests in the nuclear industry push and promote nuclear energy production as a 'green' alternative, when any logical consideration of the issue can only lead one to conclude that this is simply untrue if the entire project development is assessed – from the mining stage, to construction, operation, waste disposal and decommissioning, the carbon footprint, monetary cost, time and effort [besides the negative radioactive side effects of a NPS (these are real, even if their extent is the subject of much debate)] to produce that energy is enormous.

If the promotion of the industry is so obviously skewed at the outset, how then can Joe Public trust anything communicated by this industry, particularly in light of the extensive amount of information available in print and on the web which raises doubts (if not proves) the contrary?

Economic- and social development are indeed very important for the Overberg region, as is the supply of electricity to enable such growth. However, we believe this can be achieved without the development of a NPS in the region, through careful planning, promotion and use of the natural heritage and resources of the area. Consideration should also be given to that there are also benefits to being a unique and fairly unspoiled region with limited infrastructural development, with a certain 'exclusivity' factor to be marketed to both local and international tourists, and investors in the eco-tourism market. Renewable energy, ecological resource management, sustainable use of resources (water, natural building materials and methods, waste management etc) are also providers of business opportunities that slot in to the conservation trend of the region. Perhaps the growth rate might be slower than a full scale industrial development, but chances are it will be far more consistent and sustainable in the long run, not to mention in keeping with the rural, natural character of this region that we so prize and enjoy.

Per the specialists conclusions w.r.t. the Bantamsklip site on pg 217:

*“Accommodation for large numbers of staff and construction workers pose a serious problem, but can be mitigated. The erection of a construction village seems to be the preferred way to provide accommodation for construction workers, and should be done to enhance and support the building of sustainable human settlements. The exact location of the construction village, however, needs to be determined. The future of the construction village, after the construction phase has been completed, requires a proactive negotiated decision between Eskom and the local municipality. Large numbers of job seekers into the area will impact negatively on the rural character of the area, especially if an increase in the number of informal illegal dwellings is*

*experienced. Municipal services and social infrastructure is inadequate to cope with a growth in the number of people working and living in the area. The implementation of mitigation measures are a pre-requisite to ensure proper provision of services and infrastructure.”*

We submit that any growth in the area should be as a result of a natural and managed progression over time and not on a rapid basis as a result of an enormous industrial complex such as the proposed NPS. In addition the above highlighted negative impacts are yet further disqualifiers of the Bantamsklip site as a potential NPS site in the future.

We note that this specialist also has made no suitability rating, in order of preference, of the three potential NPS sites based on the findings of his report.

#### **RESPONSE (SOCIAL IMPACT ASSESSMENT)**

Your comments are noted. Issues regarding the influx of job seekers, employment opportunities and accommodation both during the construction and operational phases, impact on tourism and the capacity of municipalities to provide the supporting infrastructure to the Nuclear Power Station is discussed in the Draft and Revised Draft EIR (Appendix E18).

#### **YOUR COMMENT (HERITAGE IMPACT ASSESSMENT)**

##### **ANNEXURE E - HERITAGE IMPACT ASSESSMENT**

Per the Executive Summary w.r.t. Bantamsklip:

*“ By Western Cape standards the preservation and volume of archaeological sites is exceptional. Extensive mitigation will be required.  
· The natural heritage landscapes of the place are excellent and make a contribution to sense of place in the region. Given the mass and bulk of the proposed activity, unmitigatable cultural landscape impacts are expected.”*

These two points sum up why Bantamsklip should not be considered for any future NPS or any form of industrial development.

We are delighted that this specialist also considers the fuller impact of the proposed NPS by incorporating some comment regarding the associated transmission lines (pg 54) *“Indications are that the construction of transmission lines that will integrate the facility with the national grid will need to cross iconic Cape landscapes, resulting in significant impacts in terms of setting and scenery.”* This supports our view that the generation and transmission aspects of this project cannot be viewed separately, as they are completely interdependent and have a cumulative effect on the entire region, not only on the localised site.

#### **RESPONSE (HERITAGE IMPACT ASSESSMENT)**

We take note of your comments. The Heritage Impact Assessment has been revised and the report has considered Transmission Integration issues at all sites. Please also see our responses regarding the integration of generation and transmission EIAs above.

#### **YOUR COMMENT (AGRICULTURAL IMPACT ASSESSMENT)**

##### **ANNEXURE E - AGRICULTURAL IMPACT ASSESSMENT**

Regarding the land-use mapping of the Bantamsklip area, it must be noted that much of the land that has been shown as being agricultural (presumably by virtue of the current classification of the properties as Agricultural Zone 1) much of this area has in fact a formal conservation status or is in the process of being formalised into a large scale conservation area – refer to the map and comments on pg 20 of this document.

We are most appreciative of the detail that this specialist has reported regarding the susceptibilities of livestock and crops to the effects of exposure to specific radionuclides. This at least gives a realistic and statistical look at the implications of widespread nuclear radiation exposure as a result of a major accident, from an agricultural perspective and brings home the potential problems that the region could face if such an event were to occur. Certainly food for thought (pun intended!)

General comment in this regard – it is very sad that an agricultural specialist is prepared to go into some detail regarding the effects of exposure to radioactivity, but the human health assessment does not.

We are, however somewhat sceptical of the assurances that (per pg 34):

*“Therefore, it can be taken that, under normal operating conditions, the  $\mu\text{Sv/annum}$  are well below the recommended limits. As a result, any discussion on the impact of radionuclides on agriculture relates to the unintentional or accidental release of radionuclides.”*

Particularly in light of Mr Mike Kantey's queries regarding the availability (or more precisely, the lack thereof) of proper data sets regarding the effects of long-lived radioactive isotopes emitted, and the effects of not only the gaseous emissions and liquid effluents, but the risks associated with the ingestion pathway, as assessed from Koeberg data. This seems particularly relevant as, per Mr Kantey, *“Even when the emissions from the EPR and AP1000 are provided in a comparative table, it makes no sense again, since none of these reactors have been built and are actually running, anywhere in the world.”* We therefore can only support Mr Kantey's request *“What we require for a scientific assessment, therefore, is an opportunity to test the proposed technology in a real-time situation and to have tangible measurements with regard to air quality actually measured by truly independent scientists and engineers.”* in order to confirm whether the above assertion is in fact correct or not.

#### **RESPONSE (AGRICULTURAL IMPACT ASSESSMENT)**

We take note of your comments. Please see our response to Mr. Mike Kantey's submission above.

#### **YOUR COMMENT (TOURISM IMPACT ASSESSMENT)**

#### **ANNEXURE E - TOURISM IMPACT ASSESSMENT**

Per pg 4 of the report w.r.t. limitations of the study:

*“The value of unexploited natural resources in tourism impact assessment was not possible to estimate in this assessment.”*

and

*“Specific tourism visitation or tourism monetary value statistics are neither conducted in, nor available for, the tourism industry delineated and affected by the Nuclear-1 sites. Owing to budgetary cuts and time constraints, comprehensive surveys were excluded. Consequently, interviews with key tourism roleplayers and stakeholders were undertaken. These, supplemented by telephonic and electronic communications, form the basis of the data collection, analysis and report.”*

We would think that these aspects are the fundamental bases around which to formulate an assessment of the impact on tourism upon, particularly with regard to Bantamsklip which is in just such an unexploited, natural resource-rich area.

Using only bed-nights as a method of assessment, and limiting the assessment to a 20km radius around Bantamsklip are serious limitations, which across-the-board monetary value statistics as a result of thorough surveys of various kinds, would address to a large degree – so many visitors to the area are day-trippers who are accommodated in Hermanus or elsewhere in the area (or even Cape Town). We therefore submit that the region's draw-card status extends much further than 20km. Also, per pg 3, the assumption that "*Tourism bureaux accurately present industry data in each area*" is also most certainly not a sufficient basis from which to make determinations, particularly in light of the specialist's inclusion of the following on pg 17 "*Furthermore, the stakeholder cluster in the greater tourism industry consists of a large number of private organisations, firms and public-sector agencies and government departments, complicating overall policy development, coordination and implementation (South African Tourism, 2008).*"

As the above-mentioned parameters are not properly addressed, it simply makes any conclusions drawn by this assessment report shaky at best. Before the proper budgetary and time allowances are made available for the proper research to be done, and a broader spectrum of stakeholders and interested parties are involved in the gathering of the necessary data, no site-specific analysis can actually have been said to have been made.

This report emphasises the shark cage-diving and whale watching industries however makes no mention of the extensive land-based conservation initiatives that are already in place in the area, and which are undergoing much development and expansion currently. This is a drawback for a distinct sector of visitors within the eco-tourism market, as is the heritage tourism sector (both of these not necessarily overlapping with the marine-based tourism sector), and yet no mention of these aspects factor into this specialist's assessment.

This report also does not give an indication of what the potential tourism growth for the area would be if no NPS were to be built.

Whilst it takes pains to show what positive spin-offs there might be from the influx of people into the area due to the construction and operational phases of an NPS, it makes no mention of the fact that these supposed positives will be of fairly short duration, given that most of these people will leave the area once the construction has been completed. Whilst their initial presence may stimulate return visits at later date, the main stimulus that was the driver for the initial expansion (the NPS construction) will no longer be there. Now factor in the permanent losses to the tourism sector that the development of a NPS brings with it within the eco-tourism sector – this is definitely a factor which must be considered, as a fair percentage of those currently interested in the area due to its undeveloped nature will simply not be interested in visiting and/or will not come back once a NPS becomes a reality – and the picture is most certainly not as positive as the specialist tries to make out. There is also a distinct difference in expansion of facilities such as restaurants and places of accommodation resulting from an influx of people into an area as a consequence of a large-scale development, and tourism in its purest form – i.e. visitors who come to an area for leisure, rest, relaxation and to get away from their day-to-day experience – here there will also be a fair percentage of international tourists who see enough of the nuclear industry in their home countries, and certainly have no wish to see more of the same when they visit a place that markets itself as an eco-tourism destination. The essential question that needs to be asked is: which form of growth – one stimulated by an NPS or one that develops naturally (again, pun intended!) as a result of it's own inherent characteristics and assets - is more consistent, sustainable and beneficial to the region as a whole? Before this has been properly and broadly surveyed, quantified and assessed, we cannot accept this specialist's assessment that an NPS at Bantamsklip will have a positive net effect on tourism to the area.

## **RESPONSE (TOURISM IMPACT ASSESSMENT)**

Your comments are noted. Please see the revised Tourism Assessment attached to the Revised Draft EIR for comment and review.

## **YOUR COMMENT (CONCLUSION)**

In conclusion, therefore:

In order for this EIA process (and any future EIA) to be considered complete and comprehensive, we request that all relevant data and studies be made available for public participation and comment, that the EIA for the staff/worker accommodation and facilities be included in this EIA, and that the combined impact of the NPS site and the high-voltage transmission line routes be assessed and subjected to full public participation.

The Heritage specialist has made a very apt summation of the crux issues surrounding the development of a NPS (per his report, on pg 7) *“Function and safety dictate the layout and form of the nuclear structures. This means it is not possible to alter the design parameters such as form, architecture, bulk and height to suit aesthetic considerations or be sympathetic to the surrounding landscape forms. The main structure will be an un-negotiable landscape fix with bulk and location demands that fly in the face of niceties such as urban edges, spatial planning guidelines and cultural landscape conservation. The nature of the industry demands places of relative solitude and large tracts of country and coastline. Inevitably these are wild places with high scenic and conservation values. Hence, their development brings an immediately taxing conundrum to disciplines such as heritage and biodiversity conservation.”*

Whilst we accept the complexities of the above-mentioned conundrum, we feel that all of the above comment and issues raised show that this DEIR, even in its incomplete form ( with reference to, amongst other things, no EIA done w.r.t. the accommodation of staff and workers, and reports often lacking necessary empirical and quantitative data for accurate assessments to be made), contains enough information provided by the various specialists' reports to show conclusively that an NPS development would be inappropriate at Bantamsklip, now or in the future.

## **RESPONSE (CONCLUSION)**

We take note of your comments. However, it is impractical to include the EIAs for all possible associated infrastructure in the current EIA process for Nuclear-1. The current approach of in which the proposed nuclear power station and immediately associated infrastructure will be included in the EIA, has been approved by the Department of Environmental Affairs, which is the authorized decision-making body with respect to this EIA application. The transmission lines are subject to a separate EIA process that is open to public participation.

We thank you for providing us the opportunity to respond to these comments. Please do not hesitate to contact us should you require any additional information regarding this proposed project.

Yours faithfully  
For Arcus GIBB (Pty) Ltd



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Jaana-Maria Ball  
Nuclear-1 EIA Manager