

## environmental affairs

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NEAS Reference: DEAT/EIA/918/2008

DEA Reference: 12/12/20/944

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**PER FACSIMILE / MAIL**

Dear Ms Ball

### **COMMENTS ON THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONVENTIONAL NUCLEAR POWER STATION (NPS) (NUCLEAR-1) AND ASSOCIATED INFRASTRUCTURE**

The revised draft Environmental Impact Assessment Report (EIR) dated 26 April 2011 and received by the Department on 03 May 2011 refers.

On evaluation of the abovementioned document as well as the presentation given to the authorities at the workshop held with the Environmental Assessment Practitioner (EAP) on 28 July 2011, the Department has decided to submit the following comments and detail the requirements that must be addressed in the final EIR:

#### **EAP's implementation of the recommendations made by DEA as part of the acceptance of the Scoping Report**

The Department's letter of acceptance of the Final Scoping Report (SR), dated 19 November 2008, was subject to a number of conditions, including the requirement to submit a revised Plan of Study for the Environmental Impact Report (PoSEIR). Furthermore, DEA's subsequent letter of 19 January 2010 accepted the final PoSEIR, again subject to a number of conditions. However, based on the review of the revised draft EIR, the Department is of the opinion that the following conditions have not been met or in some instances were only partially met.

**Conditions contained in the Department's letter of 19 November 2008, which do not appear to have been complied with:**

Condition 1.2: Detailed Curriculum Vitae (CV) of all specialists must be included as well as proof of their applicable registration.

The CV's of all specialist lead authors / persons responsible for the specialist reports must be provided in Appendix E1.

Condition 1.3: The appointment of peer reviewers is not a legal requirement, but the role and deliverables of the peer reviewers must be made clear in the EIR.

The terms of reference of the peer reviewers is described in detail in Section 7.7.4 of the revised draft EIR. However, with the exception of the peer review report dated 08 October 2010 commissioned directly by Eskom, no reports detailing their reviews are included in the revised draft EIR.

The relevant sections of the revised draft EIR and specialist studies should be reviewed by the independent peer reviewers. Furthermore, the transmission integration report should also be independently peer reviewed and all the reviewer's reports, or at least a letter from each confirming that they are satisfied with the applicable report, must be included in the final EIR. Please include the CV's of all peer reviewers in the final EIR.

Condition 1.4: The EAP must ensure that the structure and readability of the reports is ensured when drafting the EIR and that clear cross-referencing takes place.

The Department takes note of the significant effort made in making the documentation more accessible to the public, including translating the Executive Summary of the revised draft EIR and specialist studies. However, please ensure that the Table of Contents is aligned with the report and a detailed table showing the contents of each Appendix is added in the final EIR. In addition, a table similar to the one included in the letter of 15 April 2011 should be included in the final EIR, to explain the changes between the revised draft EIR and the final EIR. Furthermore, a through technical and language edit of the entire EIR should be undertaken to ensure that all cross references are correct, and that the numerous typographical, numerical and other errors are addressed, including those related to the determination of significance ratings.

Condition 2.1: The project description information in the revised draft EIR is inadequate. It is unclear whether the application includes temporary power supply, access roads, or waste water treatment works. The proposed location and extent of the lay-down areas, the extent of earthworks required to create the platform and the volume and proposed methods of disposal of sand/ material have also not been included.

The specific items mentioned above are largely addressed, but the project description remains inadequate. The lack of clarity on the project description seems to have affected the specialist studies and the associated assessment of significance. It appears as if different disciplines assessed different aspects of the project description and alternatives. The Department therefore recommends that Chapter 3 of the revised draft EIR be revisited and all statistics converted to a common base; i.e. for a 4000MW power station. Please ensure that the project as defined by the project description has been consistently understood and assessed by all specialists.

Condition 2.2: A layout plan of the proposed footprint of the NPS must be included in the EIR, indicating where all infrastructure will be placed.

The unnumbered figures at the end of Chapter 9 of the revised draft EIR are not considered as adequate layout plans and also do not align with Figures 5-7 to 5-9. The NPS and its associated infrastructure are displayed in separate figures, making it difficult to see the cumulative picture. As a result, the associated infrastructure does not appear to have been adequately assessed. All associated infrastructure described in the project description and located within the site boundaries must be included in a comprehensive layout plan for each of the three sites, and must be discussed and assessed in the Final EIR.

All associated infrastructure outside of the site boundaries (for example access roads, transmission lines, construction villages) and not forming part of this application must be briefly described and

assessed at a strategic level as a cumulative impact. Note that those that are listed activities will need to be approved at a later date in terms of the requirements of NEMA.

Condition 2.4: The occupational exposure of any work must be controlled so that the following limits are not exceeded: "an (average) effective dose of 20mSV per year averaged over five consecutive years; a (maximum) effective does of 50 mSv in any single year".

These standards do not appear to align with those stated in Sections 3.20.4 and 3.20.5 of the revised draft EIR. The occupational and public exposure standards specified throughout the final EIR must be checked for compliance to this requirement, and any deviation from the NNR advised values must be explicitly explained.

Condition 2.14.1: The Scoping Report (SR) is deficient in presenting the suite of policies which led Government, the National Energy Regulator and Eskom to submit an application for a Pressurised Water Reactor (PWR). The screening of power generation alternatives to arrive at the conclusion that PWR is the preferred option is poorly motivated.

While Chapter 6 of the revised draft EIR contains some information on the policy context, there is no clear enunciation of specific policies leading to a decision to pursue a Pressurised Water Reactor (PWR). The fact that the "Integrated Resource Plan", accepted by the South African Cabinet in 2011, indicates the need for an additional 9600MW of nuclear power is not adequate motivation (see Section 10.1). The policy and government decisions on which Eskom's decision to pursue the proposed NPS is premised, must be described in detail in the final EIR in order to justify the need for the project and to avoid having to assess a broad range of power generation alternatives.

Condition 2.21: All the radiological issues raised during the EIA process, which are not comprehensively addressed, must be explicitly referred to the National Nuclear Regulator (NNR) to be addressed as part of their process.

The revised draft EIR does not contain a consolidated list of issues arising from the draft EIR and public process in particular; which have or will be referred to the NNR. The final EIR must therefore include a list of issues raised by I&APs and which are required to be considered by the NNR in their licensing processes.

Condition 2.22: The proposed methodology for the assessment of impacts is vague, and it is not clear how the various sites will be compared. The inclusion of economic, engineering, "strategic" and transmission information is supported, but these must then be studied, assessed and included in the EIR.

This has not been undertaken satisfactorily in the revised draft EIR and represents the main weakness of the revised draft EIR. The commitment made in the final PoSEIR, i.e. that the "degree of confidence in predictions" will be provided as per Table 2 on a scale of low, medium and high, has not been actioned in the revised draft EIR. These confidence ratings were applied in the draft EIR, which makes their omission in the revised draft EIR puzzling. The degree of confidence used in the predictions must be reinstated in the assessment tables in the final EIR.

Furthermore, as mentioned above, the final EIR must ensure that the project, as defined by the project description, has been consistently understood and assessed by all specialists. Consideration should be given to mentioning any areas of particular sensitivity within the EIA and HV yard corridors in the applicable mitigation section, but this should not necessarily affect the assessment "with mitigation". The rationale for concluding that no further units should be developed at any of the sites should be clarified. In addition, the methodology and purpose of the sensitivity mapping should be more clearly explained, and possibly all the information should be consolidated in Section 9 for clarity and ease of reference, as opposed to being split between Sections 8 and 9.

Condition 2.24: The EAP must ensure that the assessment of impacts takes cognisance of the legal and policy framework in the determination of the significance of impacts in the EIR.

While most of the specialist studies outline the applicable legal and policy frameworks, only a few have applied these as part of their assessment. The assessment methodology does not state that this is considered, and there is only some evidence of this in the specialist studies and in Chapter 9 in particular.

Condition 2.29.1: Security – The report should include confirmation of the availability of police, military, naval, etc. support. A study or review by National Key Points would be desirable.

The final EIR should clearly state that various security aspects will be dealt with as part of future planning and applications to the NNR.

Condition 2.39: All specialist reports must include impacts related to the proposed desalination plants. The impacts of beach wells during construction and operation must be assessed, and the marine ecologist must confirm that the discharge of chemicals of various sorts from the desalination process, from the waste water treatment works, the demineralisation plant and power station itself, will have no detrimental effects in either the construction or operational phases, or the additional impacts must be described and assessed.

Condition 2.43: The cumulative impacts of the proposed training centre, Pebble Bed Modular Reactor (PBMR) and this proposed NPS on the Duynefontein site must be assessed. Any mitigation and offset agreement will also have to take these issues into account.

The positive and negative implications of the Nuclear Academy would affect a suite of socio-economic and biodiversity impacts, and these do not seem to have been considered. Furthermore, in instances where the impacts have been comprehensively addressed, for example the radiological impacts, the presentation of the information in the revised draft EIR is confusing. The Department recommends that all specialists review their assessments to specifically take cognisance of the Koeberg NPS at Duynefontein.

Condition 2.44: DEAT is concerned over the fact that the Issues Trail, as well as various other responses given to I&APs, do not give a clear indication on how their inputs have been taken into account in the SR and more importantly, how it has been used to define the PoS for EIR. The EAP must ensure that all issues are addressed in the EIA phase and that the Issues Trail/s in the EIA phase allows readers to track how the responses to issues have affected the report.

The responses to the issues raised in the draft EIR have been comprehensive and the cross referencing to the revised draft EIR should assist readers. However, there is a significant amount of information hidden in meeting minutes and in the Issues Trails that has not been summarised in the revised draft EIR.

Condition 2.45: Issues raised with regard to radiology seem to have been addressed by Eskom and not by the EAP's independent nuclear expert. It is recommended that the EAP's specialist provide the responses or least review these responses to the I&APs.

It appears as if the independent nuclear experts listed in Table 7-14 have not had any input to the revised draft EIR. This should be addressed in the final EIR.

Condition 2.46, 2.47 and 2.48: The EAP must ensure that written comment is received on the draft EIR as well as the final EIR from all relevant government departments.

It is evident from Appendix B of the revised draft EIR that the key government departments have been informed, and that written submissions from the Western Cape Department of Environmental Affairs

and Development Planning and the South African Heritage Resources Agency have been received. Minutes of meetings with the Eastern Cape Department of Economic Affairs, Environment and Tourism have also been included in the revised draft EIR. The EAP must also ensure that written comment on the final EIR is received from all relevant government departments.

**Conditions contained in DEAT's letter of 19 January 2010; which do not appear to have been complied with:**

Condition 1.2: DEA recommends that in future, the EAP provide a detailed response to each condition or issue raised [by DEAT] or provide a cross-reference table indicating where it is being dealt with within the applicable document.

There is no cross-reference table in the revised draft EIR, stating where and how the requirements of DEAT's letter of 19 November 2008 and DEA's letter of 19 January 2010 are addressed. Based on the number of recommendations in this letter, it is clear that many of the Department's requirements have not been adequately addressed in the revised draft EIR. The EAP must compile a detailed cross referenced response to this letter stating exactly where in the final EIR each issue is addressed.

Condition 1.3: Other alternatives: The revised PoSEIR is not clear about what types of alternatives will be assessed in the EIA, other than plan layout options on the various sites.

While Chapter 5 describes project alternatives, the chapter is not clear on what will be taken forward and assessed in Chapter 9. While some alternatives are assessed, some are only partially assessed and others appear not to have been assessed at all. For example, it is not clear whether the biodiversity impacts of all on-site access road alignments have been assessed. Furthermore, alternatives seem to be inconsistently addressed by different specialists. For instance, the visual specialist assumes that all the excavated material will be disposed of on the sites; however, the dune morphology specialist indicates that this would represent an unacceptable impact. Contrary to this, Section 9.33.10 states that spoil will be discarded in a designated off-site spoil dump, while the marine studies include various off-shore disposal options. A pragmatic solution is eventually provided, however, it is unclear how the suite of previous incorrect assumptions has influenced the comparative site assessment both with and without mitigation by the various disciplines.

Condition 1.7: Associated infrastructure such as transport, harbours and housing are not included in the revised PoSEIR.

These are briefly described, but not assessed in the revised draft EIR. These factors could have a major influence as to which of the three sites have the lowest environmental impact. The impacts of the associated (off-site) infrastructure, including the transmission lines required during the construction phase and to evacuate the power from the three sites during operation, must be assessed in a comparative manner, but only at a strategic or conceptual level of detail (possibly as a cumulative impact as some specialists have done).

Condition 3.5: Section 4.1 and 4.2: A construction category should be added to the duration criteria and the text describing the method and table with the rating scales should be aligned.

The "0-3 years" in Table 7-16 of the revised draft EIR does not align with the construction phase definition in the accompanying text in Section 7.8.1 (c) of the revised draft EIR. Furthermore, there appears to be confusion between the duration of the impact and the timing of the impact. The definition of duration should be consistent and it should be confirmed that it has been correctly applied to each of the approximately 250 impacts.

Condition 3.6: Section 4.2.8: The cumulative impacts of the associated infrastructure of the proposed NPS must be included in the EIR.

The impacts of these activities, including the waste water treatment works, desalination plant, beach wells, etc. must be assessed as they are integral to the project and the power station cannot operate without them. The environmental impacts of the associated infrastructure on-site must be assessed in a comparative manner in the final EIR (with special attention being given to any infrastructure outside of the EIA and HV corridors), in order to ensure that the Department has all relevant information required to make an informed decision on this application. Furthermore, the associated infrastructure off-site (eg all forms of construction accommodation, access roads, temporary and permanent powerlines) must be assessed in a comparative manner but at a strategic/ concept level of detail (possibly as a cumulative impact).

Condition 3.7: Section 4.2.11: DEA suggest that mitigation measures describe "best practice", and then, based on the degree of benefit, cost, technical availability, or other criteria, Eskom can commit to implement specific mitigation measures or provide a rationale on why they are not able to implement the mitigation measures.

It does not appear as if Eskom have committed to implementing the mitigation measures described in the revised draft EIR, but it is presumed that they have considered each in terms of implementability. The particular mitigation measures proposed and which influenced the assessment of significance "with mitigation" is unclear in the revised draft EIR. In contrast the Environmental Management Plan (Appendix F) encapsulates the applicable mitigation measures and forms a solid basis for post decision environmental inputs. However, to tailor it specifically for the Thyspunt site could be regarded as presumptuous or even biased as DEA reserve the right to authorise any of the alternatives. A succinct description of the applicable mitigation measures alluded to in the "with mitigation" assessment should be included for each impact, and not just for the broad impact category. Similarly, it would be beneficial if the text in Chapter 9 aligned directly with the impact tables, as in many cases the impacts are discussed generically and it is difficult to understand what is meant by the very short impact descriptor/phrase in the assessment tables.

Condition 3.9: Section 4.4: In addition to the site layouts, alternatives relating to seawater intake and discharge systems, type of nuclear reactor, the disposal of sediment, the provision of potable water, the location of the construction and permanent accommodation and access roads, should be considered.

These have been included in the draft EIR, but the assessment of these alternatives in Section 9.33 is not satisfactory. The impacts of the associated infrastructure must be assessed in a comparative manner in detail for those on-site and for which authorisation is sought, and at a strategic/ concept level for the infrastructure off-site that is not part of the current application.

Condition 3.10.2: The EAP should include a town planning specialist, as well as explicitly task the economic, social, human health risk, agricultural, noise, tourism, site control and emergency response specialists to assess the externalities associated with any possible direct or indirect restriction on land use.

While the town planning study was not commissioned, externalities are dealt with to some extent, mostly by referring back to the EUR zones. This is relevant in the event of a major incident when there could be an effect on land use and livelihoods distant from the site. As per the commitment made in Section 4.5.1 of the PoSEIR, the impacts in the event of a major accident should be described in greater detail, for example, the effects on agriculture within 40km of the site (as alluded to in the unnumbered Table in Section 3-1 of the revised draft EIR).

## Evaluation of the potential environmental, socio-economic and cultural impacts of the project

In addition to not complying with DEA's previous conditions as outlined above, the Department would like the EAP to amend the final EIR to address the following comments and requirements.

### Ecological

- The Department is concerned as it appears as if mitigation has been applied in a highly uneven manner, which introduces considerable bias into the comparative assessment of sites. The level of mitigation applied across the three sites should be such that it allows for equitable comparison, in order to avoid bias.
- Comments relating to the loss of biodiversity (and other impacts) associated with the potential sale of Eskom sites should be revisited and the environmental and planning frameworks protecting biodiversity should be referenced.
- It is not clear what exactly has been assessed by the various ecological specialists i.e. the entire EIA corridor and HV yard corridor or just a subset. The overall assessment of the ecological values of the EIA corridor and HV Yard corridor should be revisited for each of the biodiversity aspects, for each site.
- Fire management implications for each site should be discussed and assessed, while the Threatened Ecosystem Status categories should be presented for each site.
- The Department has reservations about the assessment of significance for several of the impacts with some appearing overstated in both the specialist reports and revised draft EIR. Where ever possible, the regional context should be described to aid understanding of the significance of the impacts.

### Wetland Ecology Issues

- Table 5.3 in the Wetland Study lacks the two columns for "Nature of Impact" and "Confidence" that Tables 5.1 and 5.5 have included.
- There is a conflict between the information on page 172 of the Wetland Study which states that "despite mitigation, the residual impact of the operational phase on the coastal seeps is considered of high negative significance..." and the assessment table on page 188 which indicates that the impact of the operational phase on coastal seeps is medium after mitigation.
- As per above, the relative conservation value of the coastal seeps/wetlands on the Thyspunt site should be confirmed.

### Freshwater

- The Fresh Water Supply Environmental Impact Report concluded that at all three sites, the most viable option for an assured water supply with least environmental impact, would be the desalination of sea water. However, in the tables of mitigation measures on page 34 and 35 of the study, the use of groundwater and surface water are indicated. It must be clarified what qualities of water will be supplied by the three different sources (i.e. groundwater, surface water and desalinated water) at the three sites and, if surface and groundwater are required, why desalinated water is not sufficient to meet the requirements.

### Biodiversity

- The ecological assessment for each site must be based on the EIA and HV corridor areas as well as that associated on-site infrastructure (if this is located outside of the above mentioned corridors).
- The Threatened or Protected Species (TOPS) listed species that would be impacted by the development and that would need permits have not been identified nor have the fire management implications.
- The Dynefontein site is part of the Koeberg Nature Reserve, which is understood to have been an offset for the current Koeberg Nuclear Power Station. An explanation must be provided as to why the botanical offset is now deemed appropriate for the construction of a power station.

### Geotechnical Impacts

- The impact assessment table on page 38 of the Geotechnical Characterisation Study reflects the impact significance of a few impacts with and without mitigation. However, all three sites are represented by this table and thus are all shown to have the same impact, despite differing areas of disturbance, excavation volumes etc. as indicated by the tables on page 33 to 35 of the same study. The Department would like clarity as to why the above factors have not resulted in different significance ratings of impacts between sites and between impacts, with and without mitigation.
- It is noted that, as mitigation, the Thyspunt and Bantamsklip sites should be located as close as possible to the coast. Clarity is required as to the practicality of the mitigation measure to locate the Bantamsklip site as close as possible to the coast, given that the land closest to the sea forms part of the Protected Areas Expansion Strategy as it belongs to the State, that the Visual Impact Assessment prescribed a minimum setback of at least 200m between the high water mark of the sea and the Nuclear Power Station buildings, and that the Heritage Impact Assessment further requires a 300m wide buffer between the coast and the proposed Nuclear Power Station due to the presence of Late Stone Age archaeological sites.

### Seismic Hazards

The results of the seismic studies suggest that the three sites vary in peak ground acceleration values and that further investigations are required. Please clarify when these SHA studies will be available, whether an aseismic raft is being proposed to address the risks and confirm whether any of the sites is less suitable or requires more mitigation to achieve an equivalent degree of safety.

### Impacts on Dune Systems

- From the dune dynamic perspective, the specialist study concluded that partial or complete loss or disturbance of a dune system would not result in significant operational impacts. However, the effects of disturbance of the dune systems on species composition, ecosystem functioning, sand movement and its implications within the dune systems were not assessed in the revised draft EIR.
- The final EIR must also address the impact of the associated infrastructure on dunes, including their ecological integrity and associated fauna and flora.

### Climate Change and Extreme Events



The tsunami risk at the three sites appears to vary significantly. Please provide details of how the risks of wave damage and inundation will be mitigated at each of the three sites and update the assessment of significant both without and with mitigation accordingly.

#### Impacts on Heritage

The results of the cultural heritage study required to address SAHRA's letter dated June 2010 should be included in the final EIR, and the impact assessment updated accordingly.

#### Visual

- Having the same significance rating for all three sites is surprising. It also does not follow from the site descriptions and comments contained in Sections 8.13.3, 8.14.3 and 8.15.3 of the revised draft EIR. The visual impact of spoil dumps is made assuming the disposal of spoil on land. What was actually assessed and is actually proposed is unclear (Section 9.333.10 of the EIR). The visual impact assessment ratings should be revisited and a consistent approach towards the disposal of soil on land must be applied in the assessment. The assessment ratings should be updated to reflect the current project proposal.

#### Social

- More attention should be given to psychological stress and on the potential for social mobilisation/ opposition at the various sites.
- The significance ratings in the specialist report and those in the revised draft EIR are not consistent.
- The revised draft EIR provides no indication of where construction workers will be accommodated at any of the three sites. This information is essential since the proposed power station will have a considerable effect on municipal and social infrastructure. Details must be provided in the final EIR.
- The potential benefits and disadvantages associated with the construction of the staff village must be provided in the final EIR at a strategic/ concept level of assessment, possibly as a cumulative impact.
- Whilst the Social Impact Study indicates that approximately 25% of the construction jobs will be afforded to the local labour force, the revised draft EIR does not provide details as to what local labour force will be considered and what types of labour skills, between low and highly skilled jobs, will be afforded to the local force at all three identified sites.
- Since the safety of nuclear sites is the major concern to many citizens, especially those residing in close proximity to the identified sites; this Department requires clarity as to why the exclusive zone of the proposed nuclear power station is so much smaller than that of the existing Koeberg Nuclear Power Station.
- The Social Impact Assessment must also provide detailed information on the combined risk of the proposed Nuclear Power Station at Duynefontein and the existing Koeberg Nuclear Power Station.

### Transport

- The revised draft EIR and the transport specialist study do not align, for example the barge alternative for Bantamsklip. The access routes /roads are confusing. In addition, the social factors (e.g. effect on schools) associated with the various access route alternatives should be acknowledged and assessed at a strategic level.

### Economic

- The socio-economic impact assessment ratings should be revisited and mitigation measures for the squid and other tourist industries should be included, or a motivation must be provided as to why mitigation is not required.

### Emergency response and waste

- The section on general safety (Section 3.20.1) should be revisited, preferably by a nuclear specialist. A description of the recent Fukushima accident and its relevance to Nuclear 1 (and preferably the Koeberg NPS), including details for how this risk has been addressed, must be added to the report.

### Air Quality

- The final PoSEIR states that the "assessment of potential radionuclei emissions during malfunction or accident, to determine probable time frames and significance of risk" will be addressed. Furthermore, "The design-based accident scenarios will be established in consultation with Eskom (in consultation with potential vendors) and the NNR requirements" (Section 4.5.1 on page of the PoSEIR). The specialist report and revised draft EIR should address this issue, as it is of significant interest to the public and is relevant to DEA's decision-making.
- Clarity is required as to the potential increase in the annual dose limit for members of the public, should another nuclear facility be operational in the Koeberg area, and whether it will have a significant effect.
- The revised draft EIR indicates that liquid, gaseous, and solid waste that is regarded as radioactive will be produced. The level of radioactivity is dependent upon the choice of technology, as well as the type and quality of fuel that will be used. It also indicates that controlled discharges will be released into the environment and will not exceed a fraction of the dose limit for public exposure risk, and that Authorised Discharge Quantities (ADQ) have been defined for these waste streams. However, there is no indication of what these standards are, what the estimated levels will be from each waste stream, or whether all these contaminants from the process are addressed by the ADQ. This information must be provided in the final EIR. Also, there is no indication of how these releases will be controlled and monitored.

### Agricultural Impacts

- The Agricultural Impact Report indicates that the proposed Nuclear 1 will have low direct impacts on agricultural production on all three sites. However, indirect impacts including consumer perceptions and hence avoidance of products produced in proximity to the proposed power station should be explored in more detail in the final EIR.

### Management of Radioactive Waste

- The EIR must investigate the possible risks that the leakage of radioactive liquid from the fuel pools could pose to the environment, and indicate the location of the discharge points at all three sites

### **General Comments**

- The revised draft EIR does not take consideration of the Integrated Coastal Management Act (Act No. 24 of 2008) as well as of the latest activities within the listing notices of the EIA Regulations, 2010. The EAP is therefore advised to take note of the above and to review the listed activities to include for any coastal activities that may be triggered by the development.
- All listed activities applied for in terms of the NEMA Regulations, 2006, as indicated on the application form, must be listed in the final EIR as it appears in the EIA regulations 2006, and the EIA regulations 2010 where relevant. Based on this Department's records and previous discussions with the EAP, one EIA application has been submitted for the construction of only one Nuclear Power Station. However, it appears as if there is still some confusion amongst members of the public as to whether this EIA application for Nuclear 1 assesses the three sites as alternatives for the single proposed power station, or whether all three sites are being assessed for the development of three separate power stations. The EAP must address any public uncertainty on the matter.
- The final EIR, and where relevant the specialist studies, must be updated to ensure that they align. All areas of difference should be highlighted in the final EIR, as readers will expect the final EIR to be an accurate synopsis of the specialist studies.
- Viable mitigation and management measures should be described for all impacts and not only for the more significant impacts. The mitigation measures should be explicitly described for each impact, as opposed to a generic description per broad impact category.
- Eskom should confirm that they have considered the practicality of all mitigation and management measures and have the knowledge, resources and commitment to implement the recommended mitigation and management measures.
- Based on the degree of compliance with the DEA's conditions of approval of the SR and the final PoSEIR, the Department is of the opinion that the revised draft EIR does not demonstrate adequate compliance.
- The assessment methodology utilised in the revised draft EIR does not allow DEA to make an informed, objective and defensible decision on this application. This is a fatal flaw in the revised draft EIR and hence the revised draft EIR cannot be accepted as a decision-making tool. The revised draft EIR assessment methodology must be reworked to ensure that it facilitates a comparative assessment of alternative sites. There must be no ambiguity as to what is being assessed and the project description must be consistent for the assessment of all impacts. Furthermore, it is of utmost importance that the specialist assessments are based on the same project description; which is clearly communicated and the proposed development is consistently assessed by all relevant specialists. Any inconsistency in this regard, will have an impact on the final significance ratings.
- Further investigation into the heritage importance of the Thyspunt site, as requested by SAHRA in their letter dated June 2010, could potentially be a critical factor affecting the suitability of the site and hence the findings should be incorporated into the final EIR.

- The actual "with mitigation" measures alluded to in the impact assessment must be clearly described and must be both practicable and equitable. It is essential that the assessment methodology is transparent, robust and objective, and provides insight into the key factors driving the site preferences.
- The final EIR must also discuss the technical impediments relating to the operation of the proposed power station for all three sites.
- The Department further recommends that a thorough technical and language edit, to ensure that all the information that is presented in both hard and soft copy is correct, and that a high quality final EIR is submitted.

Overall the revised draft EIR and its appendices contain a wealth of information to inform I&APs and the Department of the proposed project and its implications. However, the report is inadequate as it has not addressed a number of the specific conditions stipulated in DEAT's letter of 19 November 2008 and DEA's letter of 19 January 2010.

The Department takes note that the EAP has complied substantially with the proposed assessment methodology described in the final PoS for EIR (September 2009) as well as the Integrated Environmental Management Guidelines published by DEA (April 1998). However, the Department has concerns with regards to the assessment methodologies utilised, including apparent differences in the application of some of the criteria (notably extent, duration and probability) between specialists. Furthermore, the method of aggregating the numerous individual impacts, the assignment of weights, the non-numerical comparison of sites and the sensitivity mapping are of concern.

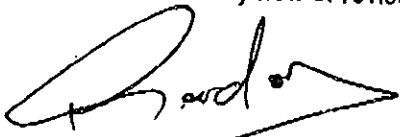
The lack of consistency in the application of mitigation measures, with extensive mitigation proposed for some sites and little for other sites, is of concern and has the potential to introduce bias into the reporting.

It is suggested that the EAP, with the support from all specialists revise the assessment methodology in order to ensure that it is consistently applied for the rating of significance of impacts at all three (3) sites assessed. As mentioned elsewhere in this document, the Department is concerned with the current inconsistent manner in which the assessment methodology is applied. The Department suggests that the revised methodology is submitted to the Department for review and comment, prior to the submission of the final EIR.

In addition, the Department kindly request that the EAP provide us with a project schedule, indicating the timeframes associated with the further roll-out of this project; after careful consideration of all the above requirements.

Should you require clarity regarding the above, please do not hesitate to contact the case officer for enquiries.

This Department reserves the right to revise its initial comments and request further information from you based on any new or revised information received.



**Mr Mark Gordon**  
**Chief Director: Integrated Environmental Authorisations**  
**Department of Environmental Affairs**

Date: 25/01/2013

CC:	Ms Deirdre Herbst	Eskom Holdings SOC Limited	Fax:011 800 5140
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Our Ref: J 31314  
5 April 2013

Director: Integrated Environmental Authorisation  
Department of Environment Affairs  
Private Bag X 447  
Pretoria  
0001

Attention: Ms. Milicent Solomons

Dear Ms. Solomons

**Tshwane**

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**RESPONSE TO DEA REVIEW OF THE REVISED DRAFT ENVIRONMENTAL IMPACT REPORT  
FOR THE PROPOSED CONVENTIONAL NUCLEAR POWER STATION (NUCLEAR-1) AND  
ASSOCIATED INFRASTRUCTURE**  
(Your reference 12/12/20.944)

Your letter dated 25 January 2013 regarding the above refers. Thank you for your comment on the Nuclear-1 Revised Draft Environmental Impact Report (EIR) that was provided to the Department of Environment Affairs (DEA) for comment in May 2011.

As you have been informed by Ms Jaana Ball, I have taken over the responsibilities as Environmental Assessment Practitioner for the Nuclear-1 Environmental Impact Assessment process. Please find our response to your review of the Revised Draft EIR below, tabulated according to the items in your above-mentioned letter and numbered for ease of reference.

Some of the DEA's comments relate to specialist assessments and in order to provide a comprehensive response, the particular specialist(s) are being consulted. These responses will be provided in later correspondence by GIBB.

We welcome the opportunity to discuss these responses at our meeting with you scheduled for 16 April 2013.

Should you have any queries in this regard, please do not hesitate to contact me.

Yours faithfully  
for GIBB (Pty) Ltd



Reuben Heydenrych  
Mega Projects Team Manager

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
1	<p><b>Conditions contained in the Department's letter of 19 November 2008, which do not appear to have been complied with:</b></p> <p><u>Condition 1.2: Detailed Curriculum Vitae (CV) of all specialists must be included as well as proof of their applicable registration.</u></p> <p>The CV's of all specialist lead authors/ persons responsible for the specialist reports must be provided in Appendix E1.</p>	<p>GIBB will ensure that the CVs of all specialists who worked on the Nuclear-1 EIA are updated and placed on the EIA websites.</p>
2	<p><u>Condition 1.3: The appointment of peer reviewers is not a legal requirement but the role and deliverables of the peer reviewers must be made clear in the EIR.</u></p> <p>The terms of reference of the peer reviewers is described in detail in Section 7.7.4 of the revised draft EIR. However, with the exception of the peer review report dated 08 October 2010 commissioned directly by Eskom, no reports detailing their reviews are included in the revised draft EIR. The relevant sections of the revised draft EIR and specialist studies should be reviewed by the independent peer reviewers.</p> <p>Furthermore, the transmission integration report should also be independently peer reviewed and all the reviewer's reports, or at least a letter from each confirming that that they are satisfied with the applicable report, must be included in the final EIR. Please include the CV's of all peer reviewers in the final EIR.</p>	<p>All specialist studies were peer-reviewed, and it was previously agreed between the EAP and DEA that it would not be necessary to include the Peer Review Reports in the EIR.</p> <p>DEA has previously been asked for a formal opinion on the review of specialist reports (see for example the minutes of the DEA meeting held on 10 November 2009). Ms. Lene Grobbelaar of the DEA indicated during this meeting that the DEA had not applied its minds to a request from the DEA&amp;DP to make the contents of peer reviews publicly available and would in time reply to this matter in writing. GIBB made it clear at this meeting that the purpose of the peer reviews was for internal quality control purposes and that the peer reviews were not prepared for public consumption. To date, GIBB has not received a written response on this matter from the DEA.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
		<p>Had the DEA confirmed its requirements in this regard when it was requested during 2009, GIBB would since have been in a position to ensure that the peer reviews were prepared for public consumption. Requiring peer review reports to be included at this late stage (a Draft and Revised Draft EIR have been produced since 2009) provides a considerable challenge.</p> <p><u>Proposal to deal with DEA comment:</u></p> <ul style="list-style-type: none"> <li>• It is proposed that the Transmission Integration Report (Appendix E28 of the Revised Draft EIR) be peer-reviewed by an independent electricity transmission / generation specialist.</li> </ul>



No.	DEA comment of 25 January 2013	GIBB response to DEA comments
3	<p><u>Condition 1.4: The EAP must ensure that the structure and readability of the reports is ensured when drafting the EIR and that clear cross-referencing takes place.</u></p> <p>The Department takes note of the significant effort made in making the documentation more accessible to the public, including translating the Executive Summary of the revised draft EIR and specialist studies. However, please ensure that the Table of Contents is aligned with the report and a detailed table showing the contents of each Appendix is added in the final EIR. In addition, a table similar to the one included in the letter of 15 April 2011 should be included in the final EIR, to explain the changes between the revised draft EIR and the final EIR. Furthermore, a thorough technical and language edit of the entire EIR should be undertaken to ensure that all cross references are correct, and that the numerous typographical, numerical and other errors are addressed, including those related to the determine of significance ratings.</p>	<p><u>Proposal to deal with DEA comment:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Revise the Table of Contents of the EIR;</li> <li>• Include a table similar to the one in the letter to the DEA dated 15 April 2011 in the revision of the EIR; and</li> <li>• Appoint a language editor to review language, grammar and referencing in the revision of the EIR.</li> </ul>
4	<p><u>Condition 2.1: The project description information in the revised draft EIR is inadequate. It is unclear whether the application includes temporary power supply, access roads, or waste water treatment works. The proposed location and extent of the laydown areas, the extent of earthworks required to create the platform and the column<sup>1</sup> and proposed methods of disposal of sand/material have also not been included.</u></p>	<p>All elements of the proposed development are detailed in the Consistent Dataset (Appendix C of the Revised Draft EIR) and described in Chapter 3 of the Revised Draft EIR (see for example Section 3.10.6 of the Revised Draft EIR, which describes the sewage treatment plant). Both of these portions of the EIR contain descriptions of the sewage treatment plant and access roads. Maps of the proposed access roads are provided in Chapter 5 of the</p>

<sup>1</sup> It is unclear what is meant by this term. No such term is used in the Nuclear-1 EIR.

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>The specific items mentioned above are largely addressed, but the project description remains inadequate. The lack of clarity on the project description seems to have affected the specialist studies and the associated assessment of significance. It appears as if different disciplines assessed different aspects of the project description and alternatives. The Department therefore recommends that Chapter 3 of the revised draft EIR be revisited and all statistics converted to a common base; i.e. for a 4000MW power station. Please ensure that the project as defined by the project description has been consistently understood and assessed by all specialists.</p>	<p>Revised Draft EIR.</p> <p>Section 3.9.1 of the revised Draft EIR provides a brief description of the excavation and disposal of spoil, while Section 5.12 of the Revised Draft EIR provides a description of the alternatives with regards to the disposal of spoil.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Revise the description of the power station will be revised to include all elements of the function of the plant throughout its life cycle.</li> <li>• Include a clear statement of the elements of infrastructure included and excluded from the application for environmental authorisation. This will include a list of site-site associated infrastructure; and</li> <li>• Ensure that all specialists have a common understanding of the elements of infrastructure to be assessed and to revise specialist studies, where necessary, to ensure consistency.</li> </ul>
5	<p><u>Condition 2.2: A layout plan of the proposed footprint of the NPS must be included in the EIR, indicating where all infrastructure will be placed.</u></p> <p>The unnumbered figures at the end of Chapter 9 of the revised draft EIR are not considered as adequate layout plans and also do not align with Figures 5-7 to 5-9. The</p>	<p>Some specifics of infrastructure included in the nuclear power station are not available because no vendor has yet been appointed for the construction of the power station. Therefore reference is made to the Consistent Dataset (Appendix C of the Revised Draft EIR), which provides a basket of criteria for a Generation III nuclear power station.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>NPS and its associated infrastructure are displayed in separate figures, making it difficult to see the cumulative picture. As a result, the associated infrastructure does not appear to have been adequately assessed. All associated infrastructure described in the project description and located within the site boundaries must be included in a comprehensive layout plan for each of the three sites, and must be discussed and assessed in the final EIR.</p> <p>All associated infrastructure outside of the site boundaries (for example access roads, transmission lines, construction villages) and not forming part of this application must be briefly described and assessed at a strategic level as a cumulative impact. Note that those that are listed activities will need to be approved at later date in terms of the requirements of NEMA.</p>	<p>Reference is also made to meetings with the DEA (see minutes of meeting held on 17 March 2008) where the DEA stated that “<i>DEAT will not specify the use of a particular nuclear technology, but will prescribe the outputs</i>” (Minutes attached for ease of reference).</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• In as far as it is possible to provide a generic layout plan of the buildings forming part of a nuclear power station without the vendor and specific technology being known, provide conceptual layout plans (block diagrammes) that cover elements of the proposed infrastructure within the EIA corridor. This will allow assessment of the cumulative impacts of all infrastructure within the EIA corridor.</li> </ul>
6	<p><u>Condition 2.4: The occupational exposure of any work must be controlled so that the following limits are not exceeded: "an (average) effective dose of 20mSV per year averaged over five consecutive years; a (maximum) effective dose of 50 mSV in any single year".</u></p> <p>These standards do not appear to align with those stated in Sections 3.20.4 and 3.20.5 of the revised draft EIR. The occupational and public exposure standards specified throughout the final EIR must be checked for compliance to this requirement, and any deviation from the NNR advised values must be explicitly explained.</p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes to rewrite the relevant sections of the EIR to ensure that they are consistent.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
7	<p><u>Condition 2.14.1: The Scoping Report (SR) is deficient in presenting the suite of policies which led Government, the National Energy Regulator and Eskom to submit an application for a Pressurised Water Reactor (PWR). The screening of power generation alternatives to arrive at the conclusion that PWR is the preferred option is poorly motivated.</u></p> <p>While Chapter 6 of the revised draft EIR contains some information on the policy context, there is no clear enunciation of the specific policies leading to a decision to pursue a Pressurised Water Reactor (PWR). The fact that the "Integrated Resource Plan", accepted by the South African Cabinet in 2011, indicates the need of an additional 9600MW of nuclear power is not adequate motivation (see Section 10.1). The policy and government decisions on which Eskom's decision to pursue the proposed NPS is premised, must be described in detail in the final EIR in order to justify the need for the project and to avoid having to assess a broad range of power generation alternatives.</p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes to rewrite the relevant sections of the EIR to provide additional information about the reasons for the decision to apply for a nuclear power station using PWR technology.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
8	<p><u>Condition 2.21: All the radiological issues raised during the EIA process, which are not comprehensively addressed, must be explicitly referred to the National Nuclear Regulator (NNR) to be addressed as part of the process.</u></p> <p>The revised draft EIR does not contain a consolidated list of issues arising from the draft EIR and public process in particular; which have or will be referred to the NNR. The final EIR must therefore include a list of issues raised by I&amp;APs and which are required to be considered by the NNR in their licensing processes.</p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Include a list of radiological issues that have not been addressed in the EIR and will provide this list to the NNR.</li> <li>• Request a meeting with the DEA, NNR and Eskom to clearly define the respective mandates and roles and responsibilities of the NNR and DEA to ensure that the EIR clearly addresses what it needs to in terms of the prevailing legislation.</li> </ul>
9	<p><u>Condition 2.22: The proposed methodology for the assessment of impacts is vague, and it is not clear how the various sites will be compared. The inclusion of economic, engineering, "strategic" and transmission information is supported, but these must then be studied, assessed and included in the EIR.</u></p> <p>This has not been undertaken satisfactorily in the Revised Draft EIR and represents the main weakness of the Revised Draft EIR. The commitment made in the final PoSEIR, i.e. that the "degree of confidence in predictions" will be provided as per Table 2 on a scale of low, medium and high, has not been actioned in the revised draft EIR. These confidence ratings were applied in the draft EIR, which makes their omission in the revised draft EIR puzzling. The degree of confidence used in the predictions must be reinstated in the assessment tables in the final EIR.</p>	<p>GIBB requests clarification from the DEA about its comments on the methodology. Does this refer to the comparison of sites or the assessment of impact significance?</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Convene a meeting with its internal peer reviewers to revise the assessment methodology in order to ensure greater certainty and transparency in the assessments. Once a revised methodology has been debated and agreed, it will be presented to DEA in order to ensure that it meets DEA's request.</li> <li>• Revisit the conclusion that no further units can be built at the sites. The methodology and purpose of the sensitivity mapping will be more clearly explained.</li> </ul>

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	<p>Furthermore, as mentioned above, the final EIR must ensure that the project, as defined by the project description, has been consistently understood and assessed by all specialists. Consideration should be given to mentioning any areas of particular sensitivity within the EIA and HV yard corridors in the applicable mitigation section, <b>but this should not necessarily affect the assessment "with mitigation"</b><sup>2</sup>. The rationale for concluding that no further units should be developed at any of the sites should be clarified. In addition, the methodology and purpose of the sensitivity mapping should be more clearly explained, and possibly all the information should be consolidated in Section 9 for clarity and ease of reference, as opposed to being split between Sections 8 and 9.</p>	
10	<p><u>Condition 2.24: The EAP must ensure that the assessment of impacts takes cognisance of the legal and policy framework in the determination of the significance of impacts in the EIR.</u></p> <p>While most of the specialist studies outline the applicable legal and policy frameworks, only a few have applied these as part of their assessment. The assessment methodology does not state that this is considered, and there is only some evidence of this in the specialist studies and in Chapter 9 in particular.</p>	<p>Specialists have, where necessary, included a review of the legal and policy frameworks in their assessments. The DEA is requested to provide examples of where it regards the assessments to have failed to take account of legal and policy frameworks.</p> <p>Whilst it is essential to consider the legal and policy frameworks in the assessment of impacts, it is also considered important to consider the sensitivity and scarcity of the resources that could potentially be affected by the power station. These factors are not always considered in legal and policy frameworks with respect to</p>

<sup>2</sup> It is unclear what is meant by this statement

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		<p>site-specific environmental resources, as the development of laws and policy often lag far behind scientific discovery (e.g. the discovery of a new species).</p> <p>Furthermore, all specialists had access to Chapter 6 of the Revised Draft EIR and took the legal and policy requirements mentioned in this chapter into account in their assessments.</p>
11	<p><u>Condition 2.29.1: Security - The report should include confirmation of the availability of police, military, naval, etc., support. A study or review by National Key Points would be desirable.</u></p> <p>The final EIR should clearly state that various security aspects will be dealt with as part of the future planning and applications to the NNR.</p>	<p>The Revised Draft EIR does state what additional requirements there are in terms of the assessment of the security risks and the definition of a security exclusion zone in terms of the National Key Points Act, 1980 (e.g. in Sections 3.20.3 and 6.4.18). It is stated that the assessment in terms of this Act falls within the mandate of the National Intelligence Agency and is therefore outside of the scope of the EIA process. If necessary, a clearer statement can be made in this regard.</p> <p>Military and naval support are nuclear safety issues and as such fall within the ambit of the NNR licensing process.</p>
12	<p><u>Condition 2.39: All specialist reports must include impacts related to the proposed desalination plants.</u></p> <p>The impacts of beach wells during construction and operation must be assessed, and the marine ecologist must confirm that the discharge of chemicals of various sorts from the desalination process, from the waste water treatment works, the demineralisation plant and power station itself,</p>	<p>The statement that “<i>all specialist reports must include impacts related to the proposed desalination plants</i>” is contested as the desalination plants do not have implications for <i>all</i> specialist assessments. In so far as the desalination plant forms part of the total footprint of the power station, its impact has been assessed. However, the desalination plant has impacts on specific media (i.e. the marine environment) and its impacts in terms of the</p>

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	<p>will have no detrimental effects in either the construction or operational phases, or the additional impacts must be described and assessed.</p>	<p>release of brine and other effluents are therefore relevant only to specific specialist studies.</p> <p>Impacts of the desalination plant in terms of the physical footprint of such a plant are minimal. The footprints of the desalination plant and wastewater treatment works form part of the proposed power station footprint and have therefore not been assessed separately from that of the power station itself. It is, therefore, argued that the assessment of the footprint of the overall plant has been sufficient. The impacts of the discharge of desalination effluent (brine) and other chemicals that will be released into the marine environment have been assessed in the relevant specialist reports such as the Marine Ecology Report (Appendix E15 of the Revised Draft EIR). This assessment takes cognisance of modelling of the dispersion of the brine and other chemicals in the marine environment.</p> <p><u>Proposal to deal with DEA comments:</u>  GIBB proposes to provide a more explicit assessment of the impacts of the associated infrastructure. In addition, a conceptual layout plan will be included in a revision of the EIR to provide an indication of the footprint sizes of all elements of infrastructure that make up the power station footprint.</p>
13	<p><u>Condition 2.43: The cumulative impacts of the proposed training centre, Pebble Bed Modular Reactor (PBMR) and this proposed NPS on the Duynefontein site must be</u></p>	<p>The Revised Draft EIR contains a clear statement that the proposed development of the PBMR has been shelved, and that there are no plans for its construction at</p>



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	<p><u>assessed. Any mitigation and offset agreement will also have to take these issues into account.</u></p> <p>The positive and negative implications of the Nuclear Academy would affect a suite of socio-economic and biodiversity impacts, and these do not seem to have been considered. Furthermore, in instances where the impacts have been comprehensively addressed, for example the radiological impacts, the presentation of the information in the revised draft EIR is confusing. The Department recommends that all specialists review their assessments to specifically take cognisance of the Koeberg NPS at Duynefontein.</p>	<p>Duynefontein. No further statement is required in this regard.</p> <p>The impacts of the Koeberg Nuclear Power Station are a given as it represents existing infrastructure that was lawfully constructed at the time. Its impacts therefore cannot be re-assessed. An EIA is, by its nature, predictive in nature and cannot assess the impacts of infrastructure constructed several decades ago.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes:</p> <ul style="list-style-type: none"> <li>• To review the authorised EIA for the training centre ensure that issues identified in that EIA are considered in the Nuclear-1 EIA.</li> <li>• To ensure that the Nuclear-1 EIA assesses the cumulative impacts of the training centre at the Duynefontein site at a high level.</li> <li>• Agreement needs to be reached with the DEA on a “cutoff” for the consideration of other infrastructure that may result in cumulative impacts. It is proposed that the Nuclear-1 EIA will assess cumulative impacts for all on-site infrastructure at Duynefontein that has already been authorised. However, future EIA processes must assess the cumulative impacts of other additional infrastructure.</li> </ul>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
14	<p><u>Condition 2.44: DEA is concerned over the fact that the issues Trail, as well as various other responses given to I&amp;APs, do not give a clear indication on how their inputs have been taken into account in the SR and more importantly, how it has been used to define the PoS for EIR. The EAP must ensure that all issues are addressed in the EIA phase and that the Issues Trail/s in the EIA phase allows readers to track how the responses to issues have affected the report.</u></p> <p>he responses to the issues raised in the draft EIR have been comprehensive and the cross referencing to the revised draft EIR should assist readers. However, there is a significant amount of information hidden in meeting minutes and in the Issues Trail that has not been summarised in the revised draft EIR.</p>	<p>The Plan of Study for Scoping has been approved, as per the letter dated 21 June 2010 received from the DEA, and should not merit any further discussion. The DEA has taken an administrative decision in terms of Regulation 31 of GN R 385 of 2006 to approve the Plan of Study for Scoping (with conditions). Thus, it would not make administrative sense to revise the PoS for EIA to indicate how comments received during the scoping phase were addressed in the PoS for EIA.</p> <p>Linkage between individual IRRs and the relevant sections in the EIR where issues are addressed is not practical, given the volume of IRRs.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to revise the Table 7-5 in Chapter 7 of the EIR to expand on the issues raised during the scoping and EIA phases and to indicate where these issues have been addressed in the EIR.</p>
15	<p><u>Condition 2.45: Issues raised with regard to radiology seem to have been addressed by Eskom and not by the EAP's independent nuclear expert. It is recommended that the EAP's specialist provide the responses or least review these responses to the I&amp;AP's.</u></p> <p>It appears as if the independent nuclear experts listed in Table 7-14 have not had any input to the revised draft EIR. This should be addressed in the final EIR.</p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes:</p> <ul style="list-style-type: none"> <li>• To appoint an independent nuclear scientist to review the responses provided in the IRRs with respect to radiological issues.</li> <li>• That the NNR be requested to review the responses on the handling of radiological issues in the EIR, for inclusion in the revision of the EIR. This will be</li> </ul>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
		<p>explored in the meeting with the DEA and the NNR proposed with regards to comment 3. In this regard, it is recognised that the NNR is the competent authority with regards to the licensing process and it is important that they retain their independence. However, their comments will be sought in terms of the broader EIA context.</p>
16	<p><u>Condition 2.46, 2.47 and 2.48: The EAP must ensure that written comment is received on the draft EIR as well as the final EIR from all relevant government departments.</u></p> <p>It is evident from Appendix B of the revised draft EIR that the key government departments have been informed, and that written submissions from the Western Cape Department of Environmental Affairs and Development Planning and the South African Heritage Resources Agency have been received. Minutes of meetings with the Eastern Cape Department of Economic Affairs, Environment and Tourism have also been included in the revised draft EIR. The EAP must also ensure that written comment on the final EIR is received from all relevant government departments.</p>	<p>The definition of “interested and affected party” under Regulation 1 of GN R 385 of 2006 includes “<i>any organ of state that may have jurisdiction over any aspect of the Activity</i>”. Accordingly, all organs of state that may have jurisdiction over any aspect of the proposed nuclear power station are included as interested and affected parties in the Nuclear-1 EIA and have been contacted throughout the EIA process for their inputs on the deliverables produced. In addition, specific authority focus group meetings have been held with the provincial environmental authorities (at GIBB’s request) to improve their understanding of the findings of the EIA process so their review of the EIR is facilitated. However, it is the responsibility of the relevant government department to decide whether or not they will comment. GIBB cannot oblige these departments to comment. Thus, for instance, the Western Cape Department of Environmental Affairs and Development Planning has provided extensive comments but no similar comments have been provided by the Eastern Cape Department of Economic Affairs, Environment and Tourism, although focus group meetings have been held with the latter department.</p>

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		<p>Your attention is furthermore drawn to the minutes of Nuclear-1 authority meeting held on 17 March 2008 (attached for ease of reference) where the issue of lack of response by authorities was raised. The DEAT committed in this meeting to write a letter to provincial authorities to request their comment on the Nuclear-1 EIA. To GIBB's knowledge such letters have not yet been issued by the DEA.</p> <p><u>Proposal to deal with DEA comments:</u></p> <ul style="list-style-type: none"> <li>• GIBB proposes to include additional information in Chapter 7 of the EIR regarding its representatives' attempts to elicit comments from government authorities. Furthermore GIBB will formally request written comment on the Revised Draft EIR from the relevant organs of state, emphasizing their right in terms of NEMA to provide comments on the EIR.</li> <li>• It is proposed that the DEA also address to provincial and other authorities requesting their comment on the Nuclear-1 EIR.</li> <li>• GIBB proposes to provide a draft list of key government institutions to the DEA for its review.</li> </ul>
17	<p><u>Condition 1.2: DEA recommends that in future, the EAP provide a detailed response to each condition or issue raised [by DEAT] or provide a cross-reference table indicating where it is being dealt with within the applicable document.</u></p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes to add a table in Chapter 7 of the EIR to give effect to the DEA's request to provide a cross-reference to the relevant sections of the EIR where DEA requirements are addressed.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>There is no cross-reference table in the revised draft EIR, stating where and how the requirements of DEAT's letter of 19 November 2008 and DEA's letter of 19 January 2010 are addressed. Based on the number of recommendations in this letter, it is clear that many of the Department's requirements have not been adequately addressed in the revised draft EIR. The EAP must compile a detailed cross referenced response to this letter stating exactly where in the final EIR each issue is addressed.</p>	
18	<p><u>Condition 1.3: Other alternatives: The revised PoSEIR is not clear about what types of alternatives will be assessed in the EIA, other than plan layout options on the various sites.</u></p> <p>While Chapter 5 describes project alternatives, the chapter is not clear on what will be taken forward and assessed in Chapter 9. While some alternatives are assessed, some are only partially assessed and others appear not to have been assessed at all. For example, it is not clear whether the biodiversity impacts of all on-site access road alignments have been assessed.</p> <p>Furthermore, alternatives seem to be inconsistently addressed by different specialists. For instance, the visual specialist assumes that all the excavated material will be disposed of on the sites; however, the dune morphology specialist indicates that this would represent an unacceptable impact. Contrary to this, Section 9.33.10 states that spoil will be discarded in a designated off-site</p>	<p>The biophysical impacts of all access road alternatives are assessed in the relevant specialist reports (Appendices E 11 to 14 of the Revised Draft EIR) and in Chapter 9 of the EIR. The relative impacts of alternative access roads to the Thyspunt site (this is the only site which has alternative access roads) are assessed in Chapter 5 of the Revised Draft EIR. The impacts tables and narrative impact descriptions of the specialist assessments in Table 9 of the Revised Draft EIR include explicit reference to the potential impacts of the alternative access roads.</p> <p>There is nothing inconsistent in the statement in section 9.33.10 of the revised Draft EIR about the offshore disposal of spoil. This is a recap of the spoil disposal alternatives and their potential comparative impacts. There are several alternatives for marine disposal of spoil (in terms of distance from shore and spoil pumping rate) as reflected in the Marine Ecology Assessment and Section 5.12 of the Revised Draft EIR.</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>spoil dump, while the marine studies include various off-shore disposal options. A pragmatic solution is eventually provided, however, it is unclear how the suite of previous incorrect assumptions has influenced the comparative site assessment both with and without mitigation by the various disciplines.</p>	<p><u>Proposal to deal with DEA comments:</u> GIBB proposes to</p> <ul style="list-style-type: none"> <li>• Add a table in Chapter 5 of the EIR to summarise the alternatives and indicate which alternatives were scoped out and taken forward to the EIA phase;</li> <li>•</li> <li>• Ensure that specialist assessments all include the same assumptions with regards to the project description (e.g. the proposed option for spoil disposal).</li> <li>• Edit the project description to include all sites on an equal basis.</li> </ul>
19	<p><u>Condition 1.7: Associated infrastructure such as transport, harbours and housing are not included in the revised PoSEIR.</u></p> <p>These are briefly described, but not assessed in the revised draft EIR. These factors could have a major influence as to which of the three sites have the lowest environmental impact. The impacts of the associated (off-site) infrastructure, including the transmission lines required during the construction phase and to evacuate the power from the three sites during operation, must be assessed in a comparative manner, but only at a strategic or conceptual level of detail (possibly as a cumulative impact as some specialists have done).</p>	<p>The associated off-site infrastructure was never requested as part of the EIA and they fall outside the scope of this study.</p> <p>No specific upgrades of harbours for Nuclear-1 are proposed at this stage and it is therefore unrealistic to require the Nuclear-1 EIA to assess potential cumulative impacts of harbour upgrades.</p> <p>Please refer in this regard to the minutes of a meeting with the DEA (attended by Ms. Lene Grobbelaar of the DEAT) and the Eastern Cape DEA&amp;ET held on 3 June 2010 where the issue of associated infrastructure was discussed (attached for ease of reference).</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
		<p>Eskom answered as follows at this meeting regarding the issue of consideration of transmission lines in the Nuclear-1 EIA: <i>“From a technical perspective, Eskom always starts with EIA processes with the generating plant and then does the EIA for the transmission lines and other associated infrastructure. This is due to technical information of transmission lines having to be developed once the capacity and placing of the generation plant is available. It is logistically very difficult to undertake the EIAs for power stations and transmission line EIAs together. Precedents for this have been set in this regard with previous EIAs undertaken by Eskom.”</i></p> <p>The cumulative impact of the power station and transmission lines is assessed at a strategic level in Chapter 9 of the Revised Draft EIR. Section 9.32.6 mentions the cumulative impacts of the power station and the transmission lines, and discounts the Bantamsklip site as an option based on its higher cumulative impacts as far as transmission lines are concerned.</p> <p><u>Proposal to deal with DEA comments:</u>  GIBB proposes to provide a more explicit assessment of the cumulative impacts of the power station and the off-site associated infrastructure, including the transmission lines and other <u>relevant</u> associated infrastructure. The EIA of the Bantamsklip transmission lines has, however, not yet commenced. The comparative assessment of cumulative impacts would, therefore, of necessity be restricted to a strategic level assessment as information related to the</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
		Bantamsklip transmission lines is not available at the same level as for the Thyspunt and Duynefontein alternatives.
20	<p><u>Condition 3.5: Section 4.1 and 4.2: A construction category should be added to the duration criteria and the text describing the method and table with the rating scales should be aligned.</u></p> <p>The "0-3 years" in Table 7-16 of the revised draft EIR does not align with the construction phase definition in the accompanying text in Section 7.8.1 (c) of the revised draft EIR. Furthermore, there appears to be confusion between the duration of the impact and the timing of the impact. The definition of duration should be consistent and it should be confirmed that it has been correctly applied to each of the approximately 250 impacts.</p>	<p>Your comment is noted</p> <p>The assessment criteria were changed at the request of the majority of specialists so that the shortest duration does not co-incide with the duration of construction, since nine years represents a significant amount of time. "Short-term" in this instance refers to three years. The text "<i>(i.e. duration of the construction phase)</i>" in Table 7.16 is incorrect and will be removed. Additionally the description of duration in Section 7.8.1(c) will be corrected to reflect the actual practice in the EIA (i.e. short term being equal to three years).</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to amend the relevant portions of Chapter 7 accordingly to reflect the fact that a three-year duration was applied to short-term impacts.</p>
21	<p><u>Condition 3.6: Section 4.28: The cumulative impacts of the associated infrastructure of the proposed NPS must be included in the EIR.</u></p> <p>The impacts of these activities, including the waste water treatment works, desalination plant, beach wells, etc. must be assessed as they are integral to the project and the power station cannot operate without them. The environmental impacts of the associated infrastructure on-</p>	<p>Please refer to Point 12 above regarding the impacts of beach wells, the waste water treatment plant and desalination plant.</p> <p>The footprints of the desalination plant and wastewater treatment works form part of the proposed power station footprint and have therefore not been assessed separately from that of the power station itself. However, as far as effluent impacts of these elements is concerned, please</p>



No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>site must be assessed in the comparative manner in the final EIR (with special attention being given to any infrastructure outside of the EIA and HV corridors), in order to ensure that the Department has all relevant information required to make an informed decision on this application. Furthermore, the associated infrastructure off-site (e.g. all forms of construction accommodation, access roads, temporary and permanent powerlines) must be assessed in a comparative manner but at a strategic/concept level of detail (possibly as a cumulative impact).</p>	<p>refer to Response 12.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Obtain copies of all relevant written deliverables pertaining to the Transmission Line EIAs in order to assess the cumulative impacts of the transmission lines on a conceptual level.</li> <li>• Assess the cumulative impacts of the associated infrastructure, at a strategic level.</li> </ul>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
22	<p><u>Condition 3.7: Section 4.2.11: DEA suggest that mitigation measures describe "best practice", and then, based on the degree of benefit, cost, technical availability, or other criteria, Eskom can commit to implement specific mitigation measures to provide a rationale on why they are not able to implement the mitigation measures.</u></p> <p>It does not appear as if Eskom have committed to implementing the mitigation measures described in the revised draft EIR, but it is presumed that they have considered each in terms of implementability. The particular mitigation measures proposed and which influenced the assessment of significance "with mitigation" is unclear in the revised draft EIR. In contrast the Environmental Management Plan (Appendix F) encapsulates the applicable mitigation measures and forms a solid basis for post decision environmental inputs. However, to tailor it specifically for the Thyspunt site could be regarded as presumptuous or even biased as DEA reserve the right to authorise any of the alternatives. A succinct description of the applicable mitigation measures alluded to in the "with mitigation" assessment should be included for each impact, and not just for broad impact category. Similarly, it would be beneficial if the text in Chapter 9 aligned directly with the impact tables, as in many cases the impacts are discussed generically and it is difficult to understand what it meant by the very short impact descriptor/phrase in the assessment tables.</p>	<p>It is questioned how the mitigation measures contained in the EIR could be unclear. They are clearly described from Section 9.3 to 9.29 in the Revised Draft EIR. These mitigation measures are also reflected in the EMP. Furthermore, the tables for each impact clearly indicate the assessment of impact significance and all other assessment criteria before and after mitigation.</p> <p>The narrative descriptions of impacts in Chapter 9 of the Revised Draft EIR are, of necessity, a summary of that contained in the specialist reports. The alternative would have been to simply reflect the working in the specialist reports verbatim. It is questioned what additional value further narrative descriptions of the impacts would provide.</p> <p>It is unreasonable to request that Eskom commit to the conditions in the EMP at this stage. Such commitment can be included as part of the authorisation decision, which Eskom would have to abide with in order to begin construction.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to:</p> <ul style="list-style-type: none"> <li>• Amend the EMP in order to include a "sign-off" to indicate its commitment to the EMP, which can be signed once an authorisation has been granted.</li> <li>• Create similar EMPs for other potential Nuclear-1 sites.</li> </ul>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
23	<p><u>Condition 3.9: Section 4.4: In addition to the site layouts, alternatives relating to seawater intake and discharge systems, type of nuclear reactor, the disposal of sediment, the provision of potable water, the location of the construction and permanent accommodation and access roads, should be considered.</u></p> <p>These have been included in the draft EIR, but the assessment of these alternatives in Section 9.33 is not satisfactory. The impacts of the associated infrastructure must be assessed in a comparative manner in detail for those on-site and for which authorisation is sought, and at a strategic/concept level for the infrastructure off-site that is not part of the current application.</p>	<p>All associated infrastructure on the site (including access roads, the desalination plant, etc.) have been assessed as part of the footprint on the proposed nuclear power station. Much of the associated infrastructure is included in the recommended footprint.</p> <p>The associated infrastructure outside the site was never requested as part of the EIA and that they fall outside the scope of this study. As proposed with regards to comment 19, a high level strategic assessment of off-site associated infrastructure will be undertaken.</p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to</p> <ul style="list-style-type: none"> <li>• Provide a more explicit assessment of the impacts of the on-site associated infrastructure; and</li> <li>• Provide an assessment of the cumulative impacts of the power station and associated off-site infrastructure.</li> </ul>
24	<p><u>Condition 3.10.2: The EAP should include a town planning specialist, as well as explicitly task the economic, social, human health risk, agricultural, noise, tourism, site control and emergency response specialists to assess the externalities associated with any possible direct or indirect restriction on land use.</u></p> <p>While the town planning study was not commissioned, externalities are dealt with to some extent, mostly by referring back to the EUR zones. This is relevant in the</p>	<p><u>The consideration of the impacts of a nuclear accident are within the domain of the NNR and as such should not be dealt with in the EIA process.</u></p> <p><u>Proposal to deal with DEA comments:</u> GIBB proposes to appoint a town planning specialist to assess impacts on land use (excluding this impacts of a nuclear accident)</p>

No.	DEA comment of 25 January 2013	GIBB response to DEA comments
	<p>event of a major incident when there could be an effect on land use and livelihoods distant from the site. As per the commitment made in Section 4.5.1 of the PoSEIR, the impacts in the event of a major accident should be described in greater detail, for example, the effects on agriculture within 40km of the site (as alluded to in the unnumbered Table in Section 3-1 of the revised draft of EIR).</p>	

Attachments:

1. Minutes of meeting: Nuclear-1 EIA and EMP held on 17 March 2008
2. Minutes of meeting: Nuclear-1 EIA and EMP held on 06 November 2009



## environmental affairs

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DEA Reference: 12/12/20/944

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### PER FACSIMILE / MAIL

Dear Mr Heydenrych

### RESPONSE TO GIBB (PTY) LIMITED ON CLARITY SEEKING QUESTIONS RAISED DURING THE MEETING HELD ON 16 APRIL 2013 REGARDING THE REVISED DRAFT EIR FOR THE ENVIRONMENTAL IMPACT

The request for this Department to provide clarity on specific items identified by the Environmental Assessment Practitioner (GIBB) during the meeting held on 16 April 2013 refers.

Following the re-evaluation of the revised draft EIR received by the Department on May 2013 and the consultation with the Department's Independent Review Panel, the response to your concerns is outlined in the attached table.

I trust everything is in order and should you require any further clarity, please do not hesitate to contact the case officer for enquiries.

Mr Ishaam Abader  
Deputy Director-General: Legal, Authorisations, Compliance and Enforcement  
Department of Environmental Affairs  
Letter signed by: Ms Millicent Solomons  
Designation: Director: Integrated Environmental Authorisations  
Date: 01/11/2013.

CC: Ms Deirdre Herbst Eskom Holdings SOC Limited Tel: 011 800 3501 Fax: 086 660 6092

Reference as per minutes of the meeting held on 16 April 2013	Department action item	Department response
4.1 Peer review of specialist studies	Provide clarification on whether peer reviews of all specialist reports included in the EIR are required.	<p>Section 7.7.4 of the revised Draft Environmental Impact Report (DEIR) states that "all reports produced during the EIA phase of the EIA were peer reviewed ...." Based on this, the Department does not understand the statement by the Environmental Assessment Practitioner (EAP) that the specialist reports were only reviewed in the Scoping Phase. The peer review of specialist reports during the Scoping Phase only, would not add much value to the EIA process, as only the proposed approach of each specialist study would have been reviewed and not the actual findings and assessment of impacts. Based on the information presented to the Department to date, the Department is of the opinion that peer reviews were done throughout the EIA process.</p> <p>Furthermore, Section 7.7.4 the DEIR also states "The peer reviewers were required to carry out the following during the Impact Assessment Phase of the EIA". In addition, the report continues by stating that Review Report templates were used and that they were compiled "with due reference to ...." a long list of guidelines as well as the Terms of Reference (ToR) for each specialist study and Final Scoping Report (FSR) and Response Report.</p>

		<p>Based on the mentioned guidelines and specifically the requirements of the Promotion of Administrative Justice Act, Act 3 of 2000 (PAJA), the Department recommends that all peer review reports, are made available to the public and the competent authority during the EIA process. All the peer review reports should be updated and or amended as the relevant specialist studies were revised or amended.</p> <p>In conclusion, the Department, based on the expectations raised in section 7.7.4 of the Revised Draft EIR hereby insists that the EAP complies with Condition 1.3 of the Departments correspondence dated 25 January 2013.</p> <p>As a minimum the Department requires detailed peer review reports for the substantive and controversial specialist studies, but will accept brief concise (for example letter type) reports for the remainder. Although, the decision on the level of detail, level of confidence and extent of the peer review remains with the applicant and the EAP, it is important to reiterate the importance of having all the peer reviewed reports included in the Final EIR (FEIR), as these reports will be considered as part of the Department's decision-making process.</p>
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4.2 a Power Station Layout	<p>GIBB is constrained in that there is no vendor in place for Nucleur-1. GIBB doesn't know what the exact layout for the proposed power station will be and can therefore only provide block illustrations to give an overall description and idea of how it will look. The exact size and look depends on the vendor to be appointed later on in the project.</p>	<p>The Department is satisfied with a provisional plant layout for the EIR phase. However, any disturbance whether temporary or permanent beyond the EIA corridor and HV yard footprints must be clearly shown in the site layout plans and the EAP must ensure that all impacts associated with these areas and activities has been assessed and environmental authorisation, where required is applied for.</p>
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4.2 b Narrative Project Description	<p>The approach was to not provide too much detailed information in the Environmental Impact Report (EIR) as all the information is readily available throughout the report. The EIR contains the "Consistent Dataset" (Appendix C) which contains detailed information and the key information from this document is repeated in the EIR. The report is already 28 lever arch files long. The intention is to prevent unnecessary duplication on information.</p>	<p>The Department does not require a duplication of Appendix C in Chapter 3 of the EIR. However, the information presented in Chapter 3 of the rDER is not clear on what is being assessed in the EIR. Please refer to Condition 2.2 on page 2 of the Departments letter dated 25 January 2013.</p>
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<p>4.3 Assessment of on-site infrastructure</p>	<p>Provide clarification as to what extent cumulative impacts need to be addressed in the EIR with respect to on-site and off-site infrastructure, including transmission lines from the power station, road upgrades, staff villages and other infrastructure.</p>	<p>The Department requires that the cumulative impacts should consider transmission line impacts from the HV yard and include the entire length of the integration lines as described in the various Transmission Line EIAs (i.e. for all three sites). For clarity, the decision on the transmission lines from the power station (PS) to the HV yard would be considered as part of the Nuclear one application, and the transmission line from the HV yard to their ultimate substation connection would need to be considered as part of the transmission line EIA process.</p> <p>Please refer to Condition 2.2 of the Department's letter dated 25 January 2013; where the Department's requirements are unambiguously stated. The Department reiterates that all off-site infrastructure; necessary for the construction and operation of the Nuclear one facility must be assessed briefly as a cumulative or indirect impact.</p> <p>If for some reason, the EAP is unable to describe, delineate the footprint and assess the impacts of some associated infrastructure within the site boundary (for example the access roads), then similarly to the transmission lines, the impacts both on-site and off-site should be assessed as a cumulative impact. The entire piece of infrastructure, whether on-site or off-site would then need to be included in a subsequent EIA process. Although</p>
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		<p>the off-site access roads do not form part of the Nuclear one application, the associated cumulative impacts should be assessed at a high level as part of the cumulative impact assessment.</p> <p>The Department remains of the opinion that a cumulative impact report, which also includes a comparison of the three sites should be included in the Final EIR. The Department is not in a position to lead the EAP in terms of the impacts that should form part of the report. This is the responsibility of the EAP; however the Department recommends that all the identified impacts are considered when cumulative impacts are assessed.</p> <p>In instances where the EAP is not sure where infrastructure or laydown areas will be located, all possible alternative locations must be assessed.</p> <p>The Department reiterates the importance of a comparative assessment of all three identified sites; i.e. all the identified impacts should be assessed evaluated and rates comparatively. The fact that Thyspunt has been identified as the preferred site, does not mean that impacts of the alternative sites needs to be assessed differently from the preferred site. This process is critical in the Department's decision-making process.</p>
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4.3 b Desalination Plant	<p>Clarification on the requirement for all specialist studies to assess infrastructure such as the desalination plant.</p>	<p>The Department concur that impacts have been assessed in the relevant specialist studies (albeit there are likely to be some biodiversity and heritage impacts associated with the temporary desalination plant and also potentially with the pipelines between the beach and the EIA corridor).</p> <p>However, Section 3.10.8 of the rDEIR (which is rather difficult to understand) states that the temporary portable desalination plant will be used during the construction phase with brine discharged to the breaker zone. Similarly, the permanent desalination plant will also obtain its water from beach wells and discharge to the breaker zone during the construction phase. The potential impacts of the temporary and permanent desalination plants, beach wells, pipelines, access routes, powerlines, chemical storage areas and brine disposal are not mentioned in the rDEIR.</p> <p>The impacts of brine disposal are well described in Appendices E15 and E16, but there is no comment on the impact of the beach wells on the marine ecosystem or groundwater system, or the discharge of treated sewage waste water during the construction phase.</p> <p>The Department must reiterate its concern that the project description and alternatives assessed in the specialist reports do not align with those in the</p>
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		<p>rDEIR. For example, E16 and other specialist studies includes the option of intake basins (as opposed to an offshore intake pipe system); every specialist study that mentions sediment disposal appears to have different volumes to be disposed of in different places (near and far marine, on and off-site terrestrial) and also from different sources (due to the excavation to the PS platform level and associated foundations, as well as from the drilling of the seawater intake and discharge tunnels), there is no mention of sewage disposal in the Section 8 of the rDEIR, while Section 3.10.6 states that treated sewage effluent during construction will be discharged via outfall tunnels (but these will presumably not be completed prior until immediately prior to operation) . These examples demonstrate why it is imperative that the fEIR include a more comprehensive project description.</p> <p>Chapter 5 of the rDEIR merely states alternatives for various aspects of the development. As these alternatives do not appear to have been assessed consistently in the specialist studies or the rDEIR, it is not clear what is actually being proposed, assessed and hence applied for environmental approval. While technically the List of Activities is actually considered for approval, they can only be approved if they are described adequately.</p>
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<p>4.4 Radiological Issues</p>	<p>Clarification whether there is a requirement in the DEAF NNR Co-operative Agreement regarding the frequency of meetings between these bodies; clarification on the mandate relating to radiological issues, nuclear fuel transport assessment and nuclear accident assessments in the EIA.</p>	<p>The Co-operative Agreement between the NNR and the Department requires the establishment of a Joint Coordination Committee, which must meet at least bi-annually.</p>
<p>4.5 b Consideration of areas of particular sensitivity "should not affect the assessment with mitigation"</p>	<p>Consideration of DEA's statement that areas of particular sensitivity "should not affect the assessment of mitigation".</p>	<p>Underlying the key problem with the methodology is the lack of clarity and consistency in terms of the spatial definition of the project footprint. This response attempts to illustrate some of the fundamental concerns about the integrity of the methodology.</p> <p>A few examples of the assessment method concerns include:</p> <ul style="list-style-type: none"> <li>• the description of Low probability in Table 7-16 is "highly unlikely", yet it is defined as "less than 50% likely that an impact will occur". Our view is that "highly unlikely" would equate to a less than 5% probability.</li> <li>• the probability definition for Medium is between 50 and 70%, while that of High is more than 75% (what happens to 70 to 75%?).</li> <li>• the Advisory Panel suggests that the probability (of the impact</li> </ul>

		<p>occurring), for High should be greater than 95%.</p> <ul style="list-style-type: none"> <li>the definition in Table 7-16 of significance for "Low to Medium" is identical to that of "Low" i.e. with a low consequence and high probability.</li> <li>similarly, the definition in Table 7-16 of significance for "Low to Medium" is identical to that of "Medium", i.e. medium consequence and low probability</li> <li>the duration definition in Table 7-16 differs from that in Section 7.8.1 and furthermore seems to have been misinterpreted in many of the impact assessments</li> <li>for Duynfontein there would be "long term discernible positive impact on tourism", yet all the impacts in Table 9-59 are negative.</li> <li>Table 9-59 has mainly Low Duration, but most of the impacts are long term permanent type impacts.</li> <li>similarly, all the Probabilities in Table 9-59 are Medium, whereas it is almost certain that all of the impacts will occur and hence should have a High probability</li> <li>the Extent of many of the impacts in Table 9-59 should be greater than Low as they occur beyond the "site-specific, affects only the development footprint".</li> </ul> <p>The Applicant is applying for the development to occur within the "EIA</p>
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		<p>corridor" and "HV yard" boundaries as indicated in Figures 5-7, 5-8 and 5-9 of the DEIR, however nowhere it actually states this clearly.</p> <p>These areas could effectively allow for three 400GVA stations to be constructed adjacent to each other, at least from a footprint perspective. This conservative envelope approach is appropriate with the level of engineering detail available and will allow the successful vendor the required level of flexibility. However, assessing these "over-sized" areas can lead to overstating of impacts if for instance a small area of high value is contained in the EIA corridor/ HV yard. The inclusion of the sensitivity maps partly illustrates this point.</p> <p>Furthermore, some disciplines appear to have applied different spatial scales when assessing different sites, particularly when it comes to mitigation (refer to for example Section 9.10 in the DEIR and in particular 9.10.4).</p> <p>Lastly, the Department assumes that the application is for linear infrastructure to cross "balance of land" (i.e. <math>\pm 1\%</math> of this area may be potentially be disturbed) and also for the area affected by the marine intake and outfalls. Some disciplines seem to have assessed this, while other disciplines do not seem to have considered the impacts in this area. Section</p>
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		<p>9.33.13 shows that the EAP is trying hard to find the least impact footprint for a power station at each site. If this sensitivity mapping were robust (almost all panel members raised concerns about how this sensitivity was derived), and the vendor was prohibited from undertaking any works (other than the linear infrastructure types described above) outside of the "least sensitive areas", would this change the EAP's recommended site?</p> <p>The Department's main concern is that it seems as if different weighting criteria were used when specialist reports were assessed. It is important to note that all specialists for all three alternatives must be assessed and weighted the same throughout the whole project. The EAP must be consistent in his approach when the specialist findings are assessed and summarised.</p>
4.5 c	<p>Clarification on the comment on DEA's letter of 25 January 2013 that specialists must consider the legal and policy context.</p>	<p>Best practise would be to draw on the relevant guidelines, policy and legislation during the determination of significance of each impact. For example, Section 9.15.2 of the DEIR used various international standards in justifying no significant impacts. The Department recommends that, where possible, other disciplines should refer back to the policy legal frameworks.</p>

<p>4.7 Cumulative Impacts</p>	<p>Clarification on the requirement to consider the cumulative impacts of Nuclear 1, Koeberg Nuclear Power Station (KNPS) and other infrastructure such as the Koeberg Training Centre at the Duynfontein site.</p>	<p>The Department considers it as absolutely essential that the EAP, as part of the EIA process consider the impacts of the existing Koeberg Nuclear Powerstation (KNPS). In this regard, in order for the Department to make an informed decision, there is a need to understand the cumulative impact, should the Nuclear one facility be approved at the Duynfontein site</p> <p>The Department is of the opinion that the existing Koeberg Nuclear Powerstation plays a major factor affecting site selection and was unfortunately not well considered by the EAP and some of the specialists. Having said this, some (not all) of the specialists have considered the presence of the KNPS well in their assessment, inclusive of the cumulative impacts.</p> <p>Please note that the Department's comments in relation to the PBMR in Condition 2.43 of the letter dated 25 January 2013 largely fall away as the PBMR are no longer being considered.</p>
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	<p>Clarification on the perception that Koeberg Nature Reserve was created as a conservation off-set at the time that the KNPS was planned.</p>	<p>Following internal consultation within the Directorate: Protected Areas, it was determined that Farm Duynfontein No.34 was declared a Private Nature Reserve in terms of Section 12(4) of the Nature and Conservation Ordinance, 1974 (Ordinance 19 of 1974). As indicated by Eskom during the meeting, colleagues from Biodiversity and Planning confirmed that no biodiversity off-sets were put in place for compensation of loss of rare and endangered species of vegetation for the present and future development in the area.</p> <p>Please note that the revised rDEIR and the specialist studies do not seem to have considered the fact that Koeberg is a Nature Reserve. This must be corrected and the reports must provide a motivation for identifying a site that is declared a Private Nature Reserve for the development of the Nuclear one facility and further provide an indication of Eskom's obligation or programme in managing Koeberg as a Nature Conservation site. The specialist's consideration of the Koeberg site as a private nature reserve and greenfield area must be clearly stated in the final EIR.</p> <p>The Department's main concern here is that the EAP has offered no offset for the Duynfontein site, the area inland of the R43 for Bantamskip and an extensive area at Thyspunt. This creates bias in the assessment of significance with mitigation measures.</p>
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Our Ref: J 31314



02 December 2013

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Dear Ms Solomons

**REQUEST FOR CLARIFICATION: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE**

(DEA Ref: 12/12/20/944; NEAS Ref: DEAT/EIA/918/2008)

The verbal discussion held between Reuben Heydenrych from GIBB and Milicent Solomons from the DEA on 10 October 2013 and correspondence received from the DEA dated 01 November 2013 refers.

GIBB has some queries on your above mentioned response, as the written response seems to differ somewhat from what we discussed verbally.

**The conservation offset issue for Duynefontein and Bantamsklip sites:**

The original DEA response at the meeting held with the DEA on 16 April 2013 indicated that there was a perception in the DEA that Koeberg Nature Reserve was created as an offset for the impacts of Koeberg Nuclear Power Station.

In DEA's final response it was stated that the EIR does not indicate that the Duynefontein site is a Private Nature Reserve. This is not correct. Section 5.2.4 of the EIR (dealing with site alternatives) states that the Duynefontein site includes Koeberg Nature Reserve. There are several references to Koeberg Nature Reserve in Chapter 8 (description of the baseline environment) of the EIR.

There is, furthermore, a seeming contradiction in the DEA's draft response, it is stated that the Duynefontein site is a greenfields site due to it being a private nature reserve. This contradicts the DEA statement during the meeting on 16 April 2013 that Koeberg is regarded as a brownfields site (please refer to bullet 7 of Section 4.7 of the minutes of the meeting - attached) due to Koeberg having been constructed there.

The last paragraph of your draft response on this issue seems to imply (possibly due to confusing wording) that the DEA expects conservation offsets not only for Duynefontein, but also for Thyspunt and for the portion of Bantamsklip inland of the R43. It is assumed that the actual intent of the wording is that significant portions of Bantamsklip and Thyspunt are proposed to be conserved as offsets for Nuclear-1, but that no similar conservation offset is



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proposed for Duynefontein. Please confirm whether this interpretation is correct. As it reads currently, it implies that no offsets have been offered for any of the sites.

**Consideration of legal and other requirements in specialist assessments:**

With reference to the our verbal discussion, you indicated that GIBB's specialists do not have to provide further justification of impact significance by referring to legal and other requirements. However, in the written response it seems to be required that other specialist disciplines must also explicitly refer to policy and legal frameworks in their assessments.

**The assessment of radiological impact:**

It was also verbally discussed that GIBB would need to assess the radiological impacts in the EIR, which would result in GIBB commissioning a quantified radiological assessment for the EIA in order to assess the significance of environmental impacts during routine operations and potential upset conditions. However, the DEA correspondence does not clarify whether the DEA recommends that radiological impacts must be assessed in the EIA.

We would appreciate it if the Department could clarify these issues as soon as possible.

Yours faithfully  
for GIBB (Pty) Ltd



Reuben Heydenrych  
Mega Projects Team Manager

Our Ref: J31314



04 December 2014

Ms Milicent Solomons  
Director: Integrated Environmental Authorisations  
Department of Environmental Affairs  
Environment House  
473 Steve Biko Road  
Arcadia  
Pretoria  
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Dear Ms Solomons

**ASSESSMENT OF RADIOLOGICAL IMPACTS: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT VERSION 2 FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref: 12/12/20/944; NEAS Ref: DEAT/EIN918/2008).**

This letter is referenced to the meeting held with the National Nuclear Regulator on 11 March 2014 attended by yourself and GIBB, our letter dated 02 December 2013 (attached as Appendix A) and the email correspondence from Mr. Heydenrych to yourself dated 14 March 2014 (attached as Appendix B).

With this communication GIBB would like to submit that there has not been any further correspondence or instruction from the Department regarding the issues in the above correspondence and the nature and assumptions of the Radiological Impact Assessment, since the engagement processes mentioned above. GIBB has, in the interim, obtained a copy of the draft NNR Guidelines for Radiological requirements for Nuclear Facilities and Activities (attached as Appendix C) and appointed a specialist to prepare a Radiological Impact Assessment Report. We assumed these draft NNR guidelines were provided to the DEA by the NNR as agreed in the meeting of 11 March 2013.

To this day, the specialist has been tasked to amend the report "Potential Radiological Impact on People and the Environment (PRIPE)", dated 30 January 2014, a report that was prepared for submission directly to the NNR as part of the NNR Nuclear Installation Site Licence (NISL) process. This process has not yet started with the NNR, however, in order to address radiological impacts in the EIA this report will be amended by the Specialist to make it compatible with EIA reporting in terms of the afore-mentioned guidelines. The full list of assumptions related to the preparation of the report is attached as Appendix D for your perusal and agreement.

The specialist has also been appointed to prepare a "Beyond Design Basis Accident Report", in which previous nuclear incidents will be analysed and the implications that these have for the radiological safety of the proposed Nuclear-1 power station will be discussed, and from which preventative and mitigatory measures will be recommended.

In terms of the project's EIA execution programme, GIBB plans to make the Revised Draft EIR Version 2 available for public comment and review early in 2015 and is proceeding with the compilation of the Radiological Impact Assessment as described above. In supporting the progress on the project, GIBB requests the Department to furnish with feedback in this regard by **12 January 2015**, in the event that the Department disagrees with the approach proposed above.

Yours faithfully  
for GIBB (Pty) Ltd



---

Elisabeth Nortje

cc. Ms Deidre Herbst  
Ms Lorraine Ndala  
Mr Tobile Bokwe  
Mr Mervin Theron  
Mr Sean O'Beirne

# **APPENDIX A**

**LETTER TO THE DEA DATED 02 DECEMBER 2013**



Our Ref: J 31314

02 December 2013

Ms Milicent Solomons  
Director: Integrated Environmental Authorisations  
Department of Environmental Affairs  
315 Pretorius Street  
Fedsure Building  
PRETORIA  
0001

Dear Ms Solomons

**REQUEST FOR CLARIFICATION: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE**  
(DEA Ref: 12/12/20/944; NEAS Ref: DEAT/EIA/918/2008)

The verbal discussion held between Reuben Heydenrych from GIBB and Milicent Solomons from the DEA on 10 October 2013 and correspondence received from the DEA dated 01 November 2013 refers.

GIBB has some queries on your above mentioned response, as the written response seems to differ somewhat from what we discussed verbally.

**The conservation offset issue for Duynfontein and Bantamsklip sites:**

The original DEA response at the meeting held with the DEA on 16 April 2013 indicated that there was a perception in the DEA that Koeberg Nature Reserve was created as an offset for the impacts of Koeberg Nuclear Power Station.

In DEA's final response it was stated that the EIR does not indicate that the Duynfontein site is a Private Nature Reserve. This is not correct. Section 5.2.4 of the EIR (dealing with site alternatives) states that the Duynfontein site includes Koeberg Nature Reserve. There are several references to Koeberg Nature Reserve in Chapter 8 (description of the baseline environment) of the EIR.

There is, furthermore, a seeming contradiction in the DEA's draft response, it is stated that the Duynfontein site is a greenfields site due to it being a private nature reserve. This contradicts the DEA statement during the meeting on 16 April 2013 that Koeberg is regarded as a brownfields site (please refer to bullet 7 of Section 4.7 of the minutes of the meeting - attached) due to Koeberg having been constructed there.

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We would appreciate it if the Department could clarify these issues as soon as possible.

Yours faithfully  
for GIBB (Pty) Ltd



Reuben Heydenrych  
Mega Projects Team Manager

## **APPENDIX B**

**EMAIL CORRESPONDENCE FROM MR HEYDENRYCH TO MS SOLOMONS DATED 04 MARCH 2014**

## Elisabeth Nortje

---

**From:** Reuben Heydenrych <rheydenrych@gibb.co.za>  
**Sent:** 14 March 2014 04:00 PM  
**To:** 'Milicent Solomons (msolomons@environment.gov.za)'; 'Wayne Hector (whector@environment.gov.za)'; 'Gabisile Hlongwane (GabisileH@environment.gov.za)'  
**Cc:** 'Elisabeth Nortje'; 'rmyburgh@gibb.co.za'; 'Urishanie Govender'; 'Tebogo Mapinga'; 'gmoonsamy@nnr.co.za'; 'Orion Phillips (ophillips@nnr.co.za)'; 'Patle Mohajane (pemohajane@nnr.co.za)'; 'pbester@nnr.co.za'  
**Subject:** RE: Nuclear-1: Draft minutes of NNR meeting held on 11 March  
**Attachments:** [7] 385924\_Eskom\_TSSR PRIPE\_Rev0 Draft 12\_30Jan14 RH assumptions hlighted.docx

Dear Ms Solomons

Based on discussion with you this afternoon, I am providing the attached to DEA for discussion with the NNR so that we can move forward to agree on a set of assumptions for the proposed radiological assessment.

The **green** highlighted portions of the attached PRIPE report include the most important assumptions for the radiological assessment. I have also requested Chapter 1 of this document, which GIBB has not yet seen, since it discusses the source terms on the basis of which this report has been prepared.

Please bear in mind that this is a DRAFT report, showing my comments.

Kind regards,  
Reuben Heydenrych

**Reuben Heydenrych**  
Mega Projects Team Manager  
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# **APPENDIX C**

**NNR GUIDELINES FOR RADIOLOGICAL EIA FOR NUCLEAR FACILITIES AND ACTIVITIES**

### NRR Guidelines for Radiological EIA for Nuclear Facilities and Activities

The Radiological Environmental Impact Assessment (REIA) is an integral part of the safety assessment in the authorization process for facilities and activities.

'Radiological impact' is taken to mean direct radiological effects that may be caused by a proposed facility or activity on human health and other elements in the environment, for example flora and fauna.

### Framework of REIA

#### Graded Approach

The level of complexity required for a decision or an authorisation process may vary depending on the type of installation, the framework of the process, and its stage in the process.

REIAs may vary from simple to complex applying increasingly more complex methodologies and modelling requiring increasing detailed data to reflect the greater complexity of the exposure situation being assessed.

The level of complexity of the assessments is decided upon taking into account the likelihood and magnitude of exposures, the characteristics of the facility and a number of additional factors. Examples of these factors and different elements that should be considered for each of them are given in Table 1.

**Table 1: Examples of Factors Affecting the Required Level of Complexity of a REIA**

<b>Factor</b>	<b>Element</b>
Inventory	Form (chemical/physical make up)
	Radionuclides
	Quantity (both activity and mass/volume)
Source term	Potential for release source term varies between normal operation and potential exposure assessments
Level of expected dose (normal operations) or projected doses (potential exposures)	Previous similar facility or previous assessments
Location of facility	Presence of receptor
	Characteristics of environment around the facility
	Exposure pathways
Characteristics of authorization process for the particular activity or facility	Phase (decision process versus authorization process)
	Requirement of regulations (licensing requirements)
Safety characteristics of the activity or facility	Number of safety barriers and engineering features present in the design
Interested parties involvement	Degree of interest

Three of the factors relating to the characteristics of the facility are important to define the complexity of the assessment namely, source term, radionuclides inventory and location of the facility. The scope and level of detail of the assessment may also vary depending on the stage in the authorization process.

For facilities like nuclear power plants and reprocessing facilities, there are likely to be a number of stages in the authorisation process. During those stages the assessment should normally be updated when more specific data is obtained.

### Background Studies

Baseline studies of radiological parameters for the site should be done to determine the ambient radioactivity of the atmosphere, hydrosphere, lithosphere and biota in order to assess the effect of the installation on the environment.

These studies must also include the impact of all nuclear activities (new and existing on site) regarding:

- Land use;
- Population demographics
- Regional development

Methodology for REIA

REIA is a prospective assessment to estimate radiological effects on the public and the environment.

REIA for planned exposure situations should consider expected exposures as a result of normal operations and also exposures that might occur as a result of potential situations (potential exposures). For this purpose, and according to the type of installations and national regulations, REIA may estimate:

- (a) Doses to the public during normal operations;
- (b) Doses or a measure of risk of health effects to the public from potential accident scenarios;
- (c) Dose rates to flora and fauna during normal operations;
- (d) Dose rates to flora and fauna resulting from potential exposure scenarios.

The specific components of a REIA are depicted in Figure 3.

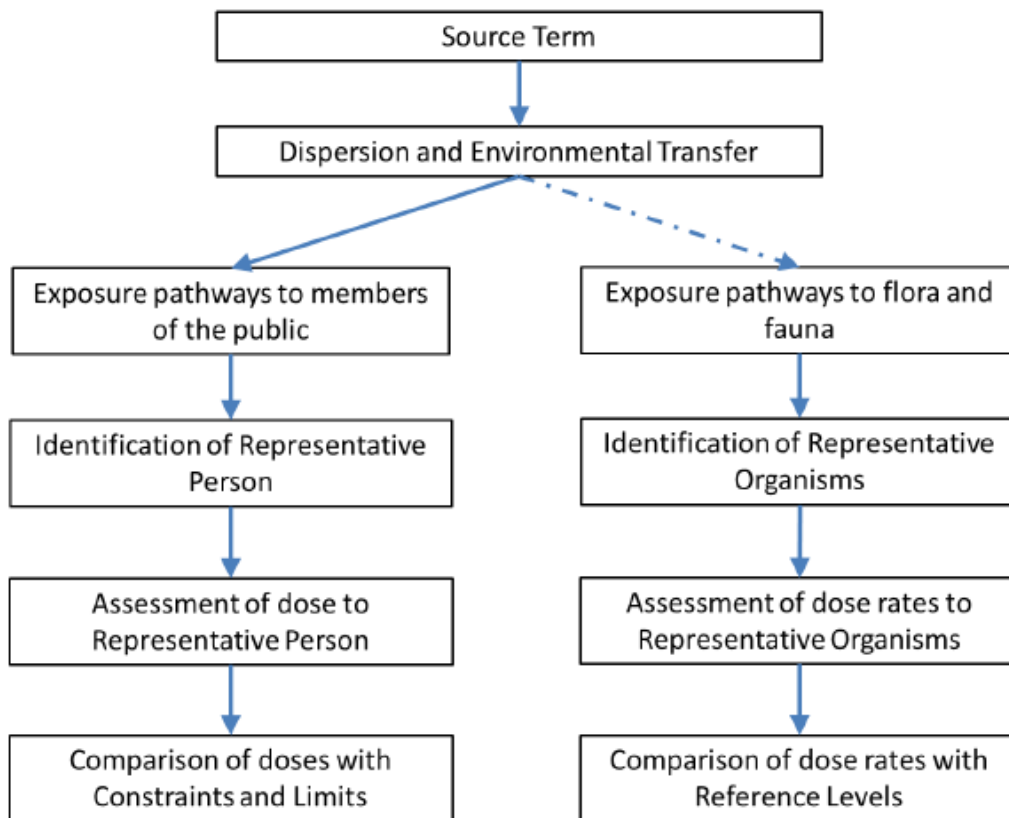


Figure 1: Components of an Assessment of Radiological Impact on Public and Environment

Source Term

The source term selected for a REIA should be appropriate for the type of facility or activity being considered.

All relevant radionuclides should be identified and, if required by the national regulatory body, details of the mechanism leading to the release of these radionuclides.

Releases to the atmosphere, to the aquatic environment and direct irradiation should be considered if relevant.

Other information that may need to be submitted, particularly for installations requiring complex assessments, includes the physical and the chemical attributes of the radionuclides released.

Source terms can be estimated on the basis of similar facilities already in operation or on the inventory of the facility or based on knowledge of its likely operation and technical characteristics.

For an initial assessment of the impact of releases during normal operations, generic source terms for the proposed facility could be used, based on published data or on the experience from similar installations.

Later, for instance in authorization process, when the type of facility has been selected (e.g. the design and detailed characteristics of the nuclear power plant) and the possible sites have been identified or decided upon, the source term should be more accurately characterized.

#### Dispersion and Transfer in the Environment

For complex assessments it is generally expected that detailed environmental dispersion and transfer models should be used to estimate activity concentrations in different environmental media.

The complexity of the model used should be commensurate with the complexity of the assessment required.

These models should be able to predict both spatial distribution and temporal variation of activity concentrations.

For assessment of exposures to members of the public these models should be able to simulate at least the following processes:

- Atmospheric dispersion;
- Deposition of radioactivity to the ground;
- Dispersion of radionuclides in surface water and ground water;
- Transfer of radioactivity to plants and animals in the food chain

For assessment of exposures to flora and fauna these models should be able to predict the activity concentrations in the relevant environmental media such as air, rivers, seawater and soil.

#### Exposure Pathways for Members of the Public

Doses should be calculated for a number of exposure pathways which are considered relevant for the exposure situations associated with releases to the environment.

An indicative list of exposure pathways for both internal and external irradiation is given below:

For releases to atmosphere and surface waters (typically, for nuclear power plants):

- Inhalation of radioactivity in an atmospheric plume;
- Ingestion of crops, animal food products (milk, meat);



- Ingestion of drinking water;
- Ingestion of aquatic food (freshwater or seawater fish, crustaceans, molluscs);
- External exposure to radioactivity in an atmospheric plume;
- External exposure to activity deposited on ground;
- External exposure to activity in water and sediments (e.g. from swimming fishing etc.).

#### Exposure Pathways for Flora and Fauna

Doses due to external exposures and doses due to intakes of radionuclides should be considered when assessing the radiological impacts on flora and fauna.

Dose rates to flora and fauna can be calculated in a simplified way — for instance, without considering detailed food chain modelling — using methods based on ratios of activity concentration and simplified dosimetric models.

As a result of simplifications, the list of exposure pathways is reduced as follows:

- External irradiation due to radioactive material in the atmosphere, water, soil and sediments;
- Internal exposure from incorporated radioactive material.

#### Identification of Representative Person

Dose should be calculated to a representative person using characteristics selected from a group of individuals representative of those more highly exposed in the population. Ref. [41] gives guidance on the characteristics of the representative person.

Habit data of the representative person should be habits typical of the population living in the region where the facility is located or of the country at large. Habit data used in an assessment can be obtained from statistics collected at national, regional or international level or, where possible, from surveys carried out at or near the location where the facility will operate. Habit data include, for example, consumption rates of food and drinking water and inhalation rates. Important characteristics when assessing doses to the representative person is the assumed location (e.g. distance and direction from the point of release), where they obtain their food, and the fraction of the food consumed that is of local origin, occupancy times (time spent at different locations) and time spent outdoors and indoors.

#### Identification of Representative Organisms

The first step in identifying representative flora and fauna is to select reference animals and plants — as a benchmark for radiation exposures of flora and fauna — that are appropriate for the types of environment under consideration.

ICRP Publication 108 has defined a set of reference animals and plants (RAPs) and their dosimetric models suitable for this purpose.

ICRP 108 RAPs cover a broad range of environmental situations, including different ecosystems and climates.

Other reference animals and plants appropriate for different environmental conditions can be derived in a similar way and, in this case, with similar needs for knowledge of the respective dosimetry models and radiation doses effects.

For flora and fauna, the concern is the protection of several species in the ecosystems at the level of populations and not the protection of individuals.

#### Assessment of Doses

The assessment of radiation doses to the public should be assessed for different age-groups and should use estimations of individual effective doses. The effective dose calculated is the sum of the committed effective dose from intakes of radionuclides (by ingestion and inhalation) and effective dose from external irradiation.

Doses from internal irradiation are calculated using dose coefficients from intakes of radionuclides by ingestion and inhalation, which provide committed effective doses per unit activity of intake, expressed in units of Sv Bq<sup>-1</sup>.

Doses due to exposure via internal and external pathways should be calculated for the representative flora and fauna.

While for humans the dose quantity used for comparison with the dose criteria is the effective dose, for flora and fauna the relevant quantity to be used is the absorbed dose rate.

#### Comparison of Public Doses with Constraints and Limits

When assessing doses to the representative person from normal operations of a single source the relevant criterion should be the dose constraint, which is a fraction of the dose limit for members of the public (1mSv/y).

Dose constraints are a source related value established or approved by the government or the regulatory body, with account taken of the doses from planned operations of all sources under control. The dose constraint for each particular source is intended, among other things, to ensure that the sum of doses from planned operations for all sources under control remains within the dose limit.

The value of the dose constraint has been established in the RP Regulations and is 0.25 mSv/a.

#### Comparison of Organisms Dose Rates with Reference Levels

ICRP 108 has defined a set of reference levels, referred to as derived consideration reference levels (DCRLs), corresponding to the set of reference animals and plants.

DCRLs are dose-rate bands that span an order of magnitude and specify levels of exposure that may indicate a very low probability of effects to flora and fauna.

For dose rates below the base of DCRL bands, no effects have been observed.

The DCRLs do not represent limits; they should be considered to be dose ranges within which a more detailed evaluation of the situation would be warranted.

# **APPENDIX D**

**ASSUMPTIONS FOR THE AMENDMENT OF THE PRIPE REPORT TO BE IN LINE WITH EIA REPORTING**

## POTENTIAL RADIOLOGICAL IMPACT ON THE PUBLIC AND THE ENVIRONMENT

### Introduction to the Main Assumptions and Framework for the Radiological Impact Assessment

It is assumed that DEA accepts the draft NNR REIA guide and that the report on human and non-human radiological risk is prepared according to this guide

It assumed that the graded approach discussed in the draft REIA is carried out to the level of depth required for siting, the initial nuclear licensing phase, and addresses the following main aspects:

- The radiological impact of normal releases on the local population and environment; and
- The potential radiological impacts of an accident requiring emergency response.

The report will also include a summary of the results of a reconnaissance background radiation surveys performed at the sites.

The report is based on the EPR and AP1000 reactors as reference designs of the GEN III reactors in terms of source terms for normal operation and severe accidents as the technical basis for emergency response. It must however be noted that these source terms were the only public available information obtained through desk top research and hence will be limited to these reference designs.

The basic framework for the sites' radiological assessment is defined by the following:

An assessment is carried out in line with the early nuclear licensing phase defined as siting. The concept of siting is best defined by the International Atomic Energy Agency and quoted here:

*“The selection process of a suitable site, termed as “siting”, for a nuclear installation is a multi-faceted process where safety considerations largely dominate. A properly selected site provides two distinct levels of defence in depth. The first level is prevention and aims at decreasing the exposure to external hazards. It involves a comprehensive process of screening out sites where hazards are dominant and complex designed safety measures would be necessary for site utilization. The second level is mitigation and aims at decreasing the impact of an accident on the environment. It involves the selection of a site with good dispersion characteristics of radionuclides in the air, surface as well as sub-surface water, and also terrain, population and infrastructure that are conducive for the implementation of an emergency plan.”*

The current regulatory requirements relevant to the evaluation of radiological impact during site characterisation for new nuclear installations are stipulated in the following documents:

- National Nuclear Regulator Act, 1999 (Act No. 47 of 1999);
- Regulation No. R. 388 in Terms of Section 36, Read with Section 47 of National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) on Safety Standards and Regulatory Practices;
- Regulations on Licensing of Sites for New Nuclear Installations. Government Notice

No. R 927 of 2011..

The specific regulation on public impact is:

*“Requirements for a Site Safety Report*

*5. A Site Safety Report referred to in Regulation 3 (2)(a) must contain the following....*

*(6) An analysis of the impact on the public due to normal operations of the new nuclear installation(s), including minor occurrences that can be kept under control, to demonstrate compliance with the dose limits. This analysis must include the impact of all nuclear installations and actions on the site, existing and proposed, for which authorizations have been granted by the Regulator.”*

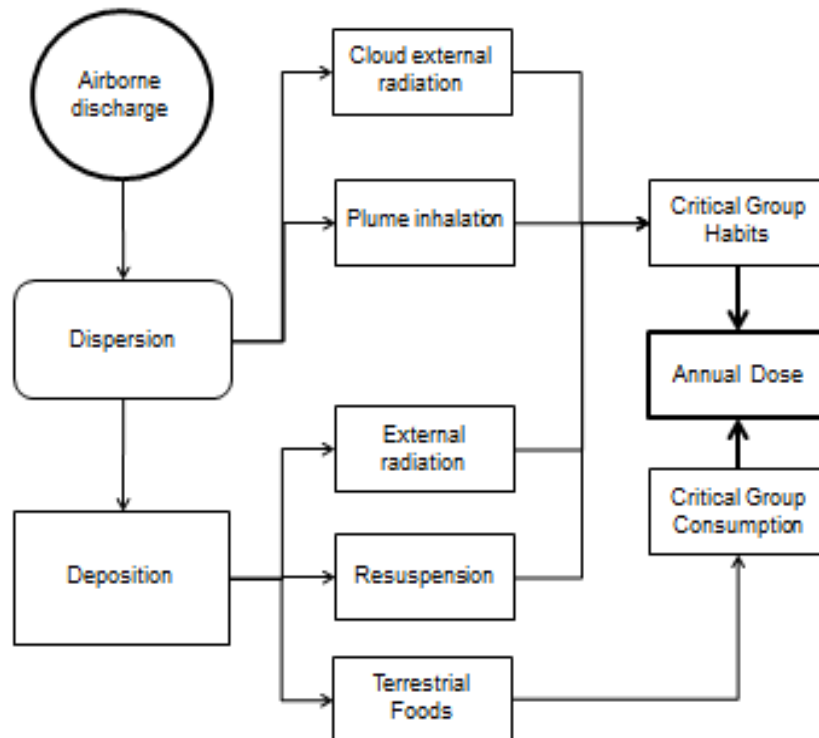
Regulations specify an annual effective dose limit from all authorised actions of 1 mSv applicable to members of the public. To ensure that the limit is not exceeded, dose constraints are also specified for individual sources. For South Africa (NNR) a dose constraint of 250  $\mu$ Sv/y is specified. For the purposes of the radiological impact assessment the nuclear installation(s) on the site is considered as a single source that shall not exceed 250  $\mu$ Sv/y.

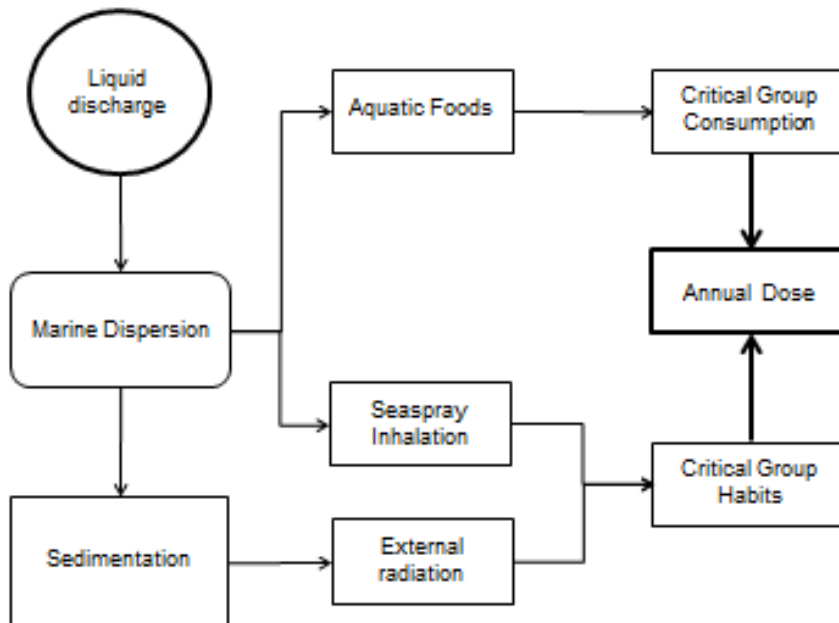
### **Specific Assumptions**

1. The EIA is applicable to a proposed 4000 MWe Nuclear-1 installation. The site's radiological impact assessment is carried out in a conservative and bounding manner in line with the provision for the potential future expansion of the power station, to allow for a total capacity of approximately 10 000 MW (note this statement is copied from the final chapter 3 of EIA)\_  $\approx$  33 000 MW<sub>th</sub>. Please note that should an EIA authorisation be granted for 4 000 MWe for a site, a revised safety assessment could be required for increased power levels; this study based on 10 000 MWe as bounding power is therefore only valid in this current EIA and does not imply that it will also be valid for future expansion on the site to power levels above 4 000 MWe. The assessment will demonstrate for normal operations that the constraint on annual effective dose defined for the public in national safety standards can be met by using the proposed conservative assumptions at this early stage when the specific GEN III technology has not yet been selected and uncertainties are large.
2. The radiological safety assessment is carried out for two categories of radioactive effluent discharges from the nuclear installation: 1) normal and continuous operational discharges - It is assumed that these discharges continue for 60 years, the planned operational life of the nuclear installation(s); 2) short term contingency discharges that result from minor operational occurrences that can be kept under control.
3. Apart from the safety assessment for humans, a screening assessment is also performed of the potential radiological impact on non-human species.
4. The radiological risk is done by assessing source terms for severe accidents provided in the generic Level 2 Probabilistic Risk Assessment (PRA) studies of two reactor types, AP1000 and EPR. This PRA studies are public available whereas other PWR designs are not and requires contractual relationship. These two reactors are therefore enveloping representatives

of the power range of GEN III reactors to be selected for Nuclear-1. The reactor thermal powers for the AP1000 and EPR are 3 415 MWth and 4 500 MWth respectively. The occurrence frequencies of severe accidents and associated source terms are assessed to determine public dose and site feasibility in terms of emergency planning requirements.

5. The site independent and generic design information available for two reference nuclear installations includes only limited safety information on external accident initiating events (IE). The full scope of external IEs specific to the site will have to be considered in a safety analysis of a specific nuclear installation(s) once it has been selected for the sites. The assessment will make limited quantitative statements on radiological risk pertaining to design basis and severe beyond design basis accidents. Support for a qualitative statement that the radiological risk at the site is expected to meet NNR risk criteria, relies on Eskom's commitment to Generation III nuclear reactor technology and their acceptance of EUR safety criteria.
6. The impact is assessed at the end of 60 years of operation of the new nuclear installation(s), an approach that accounts for any build-up of radioactivity in the environment.
7. The radioactive discharges during normal operation for the new nuclear installation(s) are derived from parameter enveloping information supplied by Eskom.
8. A dose assessment for members of the public includes a specific set of exposure pathways and these are illustrated in the following figures and discussed:





The dose assessment for a new nuclear installation is a prospective assessment. A deterministic approach based on conservative assumptions is followed. It provides a bounding assessment of dose that demonstrates compliance with the NNR regulatory dose constraint of 250  $\mu\text{Sv/y}$ . A dose assessment based on more realistic assumptions to demonstrate optimisation of radiological protection as part of the ALARA (as low as reasonably achievable) principle requires detail design information of the nuclear installation(s) to be built. It forms part of the Safety Analysis Report (SAR) typically prepared for the construction licensing phase as part of the NNR process. The more realistic assumptions should result in a significantly lower dose to the public when compared to the results reported in this site assessment. In the NNR current site assessment, for example, the atmospheric discharges are assumed to be at ground level. In a real situation, the discharge will be at a typical height of 40 m or more, equal to the design height of the nuclear installation stack. This will result in lower atmospheric concentrations in the public domain and therefore a lower radiological impact.

The annual dose, whether as a result of intake of radionuclides via ingestion and inhalation, or external radiation, comprise basically three components:

- dose from normal and continuous airborne and liquid discharges;
- dose from airborne discharges resulting from minor operational occurrences;
- dose from radiation from the nuclear installation(s) containment structures.

Dose assessment for normal operation of the nuclear installation(s) is done with a high pedigree the code *PC-CREAM 08*. There are various similar codes available internationally to perform a dose assessment. *PC-CREAM* was chosen because of its extensive international user base. It was also used in the generic design assessments of the EPR and AP1000 in the United Kingdom.

When the radiological impact of discharges from a nuclear installation is assessed, it is normally assumed that discharges occur continuously and uniformly over a year. However, during normal operations when radionuclides are discharged to the atmosphere, it is possible that short-term contingency discharges due to routine maintenance operations, particular features of operation, or minor occurrences may occur. Such short-term discharges may lead to doses that are higher, or lower, than would be expected if it were assumed that the discharges are continuous over a year.

The transient nature of the radiological impact of the contingency discharges are assessed using the code *PC COSYMA* (an accident code) for noble gases, particulates, and halogens, and a special implementation procedure of *PC-CREAM* for the radionuclides H-3 and C-14. The dose from the contingency discharges is added to the annual dose calculated for normal and continuous discharges.

The *ERICA* (Environmental Risk from Ionising Contaminants: Assessment and Management) software system is used to perform a screening assessment of the dose rate to two generic sets of reference species consisting of terrestrial and marine biota.

Liquid and airborne source terms for normal and continuous operational discharges used in the radiological assessment represent a nuclear installation that will generate 33 000 MW<sub>th</sub>. The source terms are derived from the data provided for two reference reactor types, AP1000 and EPR. Enveloping airborne and liquid source terms are constructed by selecting the maximum radionuclide specific source term when comparing the two reactor types. The radionuclide specific source term was then scaled up to represent 33 000 MW<sub>th</sub>.

Long-term average values of atmospheric concentrations and ground deposition from continuous discharges are calculated using the sector-averaged version of the Gaussian plume model, a model that is part of *PC-CREAM*. It assumes a laterally uniform concentration in each of eighteen wind direction sectors. This is accepted as a reasonable assumption because of wind meander over prolonged periods of time. The weather data collected by the onsite weather station over a one year period were used. It is reported in the air quality study of the sites that the prevailing wind speed and direction is not expected to vary significantly across the area where the radiological impact is determined. It is also expected that average wind speeds and their annual average directions will not change significantly over the lifetime of the nuclear installation(s).

A nuclear installation(s) with 33 000 MW<sub>th</sub> generating capacity will consist of numerous reactor units and multiple stacks for airborne discharges. For the purposes of the site safety assessment, discharges are combined into a single virtual source. A ground level discharge is considered and this approach provides a conservative estimate of public dose and environmental impact.

The important parameters and their values used in the modelling of air and ground concentrations are listed here:

Parameters	Values
Weather data	Site specific hourly weather data for a full year



Parameters	Values
Level of release	Ground level release (0 m)
Deposition velocity (ms <sup>-1</sup> )	1 x 10 <sup>-3</sup> (others), 1 x 10 <sup>-2</sup> (Iodine isotopes), 0 (Noble gases, H-3 and C-14)
Rain washout coefficient (s <sup>-1</sup> )	1 x 10 <sup>-4</sup> , 0 (Noble gases)
Surface roughness factor (m)	0.3 (typical of agricultural areas)

For radioactive liquid discharges, a single discharge point is considered. The discharges are assumed to take place into a local marine compartment linked to a regional oceanic compartment.

Marine Component	Volume (m <sup>3</sup> )	Depth (m)	Coastline Length (m)	Volumetric Exchange Rate (m <sup>3</sup> /y)	Suspended Sediment Load (t/m <sup>3</sup> )	Sedimentation Rate (t/m <sup>2</sup> /y)	Sediment Density (t/m <sup>3</sup> )	Diffusion Rate (m <sup>2</sup> /y)
Local marine compartment	2.00E+08	1.00E+01	1.00E+04	4.00E+09	2.00E-04	1.00E-04	2.60E+00	3.15E-02
Regional ocean	8.98E+17	3.80E+03	--	--	1.00E-08	3.00E-06	2.60E+00	3.15E-03

The dimensions of the local marine compartment will be based on conservative selection from typical dimensions of a large set of marine compartments described in *PC-CREAM*. A more detailed study of the local compartment should be included in a future optimisation study.

An important aspect of the liquid discharge is the potential build-up of radionuclides in the environment during the life of the nuclear installation(s), e.g. in beach sediments. The radionuclide build-up in soil from airborne discharges and in marine sediment from liquid will be calculated.

Habit data and the selection of critical groups (Representative Persons) will be considered in a manner to derive a bounding set of input data for dose modelling. The time when radiation doses are at a maximum is calculated at year 60, the expected life of the nuclear installation(s) and when build-up of radionuclides in the environment is at a maximum. The maximum potential dose to members of the public is determined by considering multiple and to a large extent hypothetical Critical Groups as follows. Coastal sites would typically require the assessment of radiological impacts on two types of critical groups:

- a farming family; and
- a fishing family.

A Critical Group is constructed combining the habit data of the two family types. This represents a hypothetical construct, which is conservative in respect of all the exposure pathways considered in the dose assessment. A fishing family, for example, does not necessarily consume the same amount of local farm products as the farming family. It is

reasonable to assume that permanent residents in the nearby towns and on farms in the vicinity of the site will be enveloped by this approach. Their actual exposure pathways will form a subset of exposure pathways of these two types of critical groups.

The exposure pathways assessed for each site:

<b>Atmospheric Exposure Pathways</b>	<b>Marine Exposure Pathways</b>
Inhalation of airborne radionuclides	Inhalation of radionuclides in seaspray from the local marine compartment
External gamma dose from airborne radionuclides	External gamma dose from radionuclides in sediment (beach sand at edge of the local marine compartment)
External beta dose from airborne radionuclides	External beta dose from radionuclides in sediment
External gamma dose from deposited radionuclides	External gamma dose from radionuclides on fishing gear
Inhalation from re-suspended radionuclides	Consumption of radionuclides in fish, molluscs and crustaceans
Consumption of radionuclides in beef, cattle liver, cow milk, mutton, sheep liver, green vegetables, root vegetables, fruit and grain	-----

Other potential exposure pathways, e.g. external radiation when swimming in the sea, will be demonstrated to make an insignificant contribution to the annual dose.

The ICRP has developed dose coefficients for six age groups (3 months; 1, 5, 10, 15 years; and adult). However, the ICRP considers that three age groups are generally sufficient to encompass age-related exposure and dose variation. The ICRP states that the level of detail afforded by its provision of dose coefficients for six age groups is not necessary in making prospective assessments of dose given the inherent uncertainties usually associated with estimating dose to the public and with identification of the representative person. It recommends the use of three age groups for estimating annual dose to the representative person for prospective assessments. These groups are:

- Infant: 0–5 years;
- Child: 6–15 years;
- Adult: 16–70 years.

For practical implementation of this recommendation, dose coefficients and habit data for a 1-year-old infant, a 10-year-old child, and an adult should be used to represent the three age categories. This is the approach for age groups used in *PC-CREAM*. In all cases committed dose from radionuclides taken into the body are integrated to age 70.



## environmental affairs

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### PER FACSIMILE / MAIL

Dear Ms Nortje

#### **ASSESSMENT OF RADIOLOGICAL IMPACTS: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT VERSION 2 FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE (DEA Ref: 12/12/20/944; NEAS Ref: DEAT/EIN918/2008)**

Your correspondence dated 3 December 2014 regarding the abovementioned subject matter and prior correspondence issued by this Department dated 1 November 2013 as well as the meeting held with the National Nuclear Regulator (NNR) on 11 March 2014 refers.

With reference to the communication dated 3rd of December 2014 received from GIBB, the Department responds as follows:

#### **The conservation offset issue for Duynefontein and Bantamsklip sites:**

***“The original DEA response indicated that there was a perception in the DEA that Koeberg Nature Reserve was created as an offset for the impacts of Koeberg Nuclear Power Station.”***

It is correctly stated that the above was a perception within the Department and it was expected that Eskom will be able to provide some clarity on this matter; especially in terms of the offset discussions held during the planning phase of the existing Koeberg Nuclear Power Station (KNPS). Eskom, subsequently confirmed during a meeting held on 16 April 2013 that no offset were put in place as part of the existing KNPS.

***“In the DEA’s final response it was stated that the EIR does not indicate that the Duynefontein site is a Private Nature Reserve. This is not correct. Section 5.2.4 of the EIR (dealing with site alternatives) states that the Duynefontein site includes Koeberg Nature Reserve. There are several references to Koeberg Nature Reserve in Chapter 8 (description of the baseline environment) of the EIR”***

The abovementioned sections of the revised draft EIR does not specifically indicate that the Duynefontein site is a Private Nature Reserve as declared in terms of the Nature Conservation Ordinance (Ordinance 19 of 1974). In addition, the Departments correspondence dated 01 November 2013 specifically request that the

revised draft EIR must provide a motivation for identifying a site that is declared a Private Nature Reserve for the development of the Nuclear 1 facility.

The Department hereby recommends that an offset guideline is considered as part of the environmental impact assessment process for the Nuclear 1 application; specifically at the Duynfontein site. Furthermore, please provide an indication of Eskom's commitment in managing the Duynfontein site as a Private Nature Reserve and greenfield area.

***“There is, furthermore, a seeming contradiction in the DEA’s draft response, it is stated that the Duynfontein site is a greenfields site due to it being a private nature reserve. This contradicts the DEA statement during the meeting on 16 April 2013 that Koeberg is regarded as a brownfields site (please refer to bullet 7 of Section 4.7 of the minutes of the meeting - attached) due to Koeberg having been constructed there.”***

The Duynfontein Farm 34 as a declared Private Nature Reserve maintains its status as a greenfield, due to most of it being undeveloped and characterised by natural vegetation falling with the fynbos biome. On another site, the existing KNPS site is regarded a brownfield, due to it being developed. Therefore Duynfontein Farm 34 carries two different land use status and further development on the greenfield side will potentially change the general character and the sense of place.

***“The last paragraph of your draft response on this issue seems to imply (possibly due to confusing wording) that the DEA expects conservation offsets not only for Duynfontein, but also for Thyspunt and also for the portion of Bantamsklip inland of the R43. It is assumed that the actual intent of the wording is that significant portions of Bantamsklip and Thyspunt are proposed to be conserved as offsets for Nuclear-1, but that no similar conservation offset is proposed for Duynfontein. Please confirm whether this interpretation is correct. As it reads currently, it implies that no offsets have been offered for any of the sites.”***

As stated in the DEA's letter dated 01 November 2013, no offsets have been offered for any of the proposed sites. Where reference has been made regarding the offsets in the revised draft EIR, the issue must come out clearly, indicating the actual area considered as an offset and the ratio for the different vegetation types which will be impacted on, whether on-site or off-site the proposed footprint of the Nuclear Power Station. If available the plans or programme for the conservation of those sites as nature reserves must be included in the EIR. The EIR must discuss any possible inclusion of offsets, where relevant.

#### **Consideration of legal and other requirements in specialist assessment:**

***“Consideration of legal and other requirements in specialist assessments: in my verbal discussion with you, you indicated that you are satisfied that we do not have to provide further justification of impact significance by getting the specialists to refer to legal and other requirements. However, in the written response it seems to be required that other specialist disciplines must also explicitly refer to policy and legal frameworks in their assessments.”***

The verbal response indicates that you do not have to provide further justification of impact significance by getting the specialists to refer to legal and other requirements, and similarly the written response indicates that where possible, other disciplines should refer back to the policy legal frameworks. Both statements do not necessarily make this requirement compulsory to fulfil, especially where it may not be possible to do so.

**The assessment of radiological impact:**

***“It was verbally discussed that GIBB would need to assess the radiological impacts in the EIR, which would result in GIBB commissioning a quantified radiological assessment for the EIA in order to assess the significance of environmental impacts during routine operations and potential upset conditions. However, the DEA correspondence does not clarify whether the DEA recommends that radiological impacts must be assessed in the EIA”***

The EIA must identify and discuss the anticipated radiological impacts and possible mitigation measures as a standard requirement in term of the NEMA EIA Regulations 2010, Sub-regulation 31(2)(k) of GNR 543 which states the following: ***“An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35 and must include a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures”***.

This matter was discussed with the EAP during the meeting held with the NNR on 11 March 2014. Subsequent to the aforementioned meeting, the NNR provided detailed comments on the proposed radiological impact assessment (please refer to the attached). From a review of your proposed approach and the NNR Guidelines for Radiological EIA for Nuclear Facilities and Activities, it appears as if the aforementioned is in line with the comments received from the NNR. Please ensure that the Radiological Environmental Impact Assessment is in line with the NNR requirements, prior to submission of the EIR to this Department for decision-making.

I trust the above is in order and should you require further clarity, please do not hesitate to contact the case officer for enquiries.

Yours faithfully



**Mr Sabelo Maiza**  
**Chief Director: Integrated Environmental Authorisations**  
**Department of Environmental Affairs**

**Date:** 06/03/2015

Cc:  
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Our Ref: J31314  
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10 February 2015

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Dear Ms Solomons

## **IMPACT ASSESSMENT METHODOLOGY: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT VERSION 2 FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE**

This letter is referenced to the meeting held with the National Department of Environmental Affairs ("the Department") and GIBB (Pty) Ltd (GIBB) on 16 April 2013 regarding the Department's comments on the Nuclear-1 Draft Environmental Impact Assessment Report, dated 25 January 2013.

During the aforementioned meeting the Department requested GIBB to revise the impact assessment criteria used in the report so that there is a more logical and defensible criteria for assessment of significance and identification of a preferred site. GIBB has since undertaken several consultation workshops with the specialists involved in the project, the independent peer reviewers on the project as well as other recognised experts within the Environmental Management Field. As such the revised approach to the assessment of significance, the criteria used to determine said significance and the methods used to reduce the multitude of impacts to clear, succinct decision making factors, is discussed in the sections below.

GIBB has explored getting the specialists to revise their original significance rankings and have concluded that this will be a major logistical challenge, as well as being very disruptive to the consultation process. We are also wary about such changes being perceived as unduly influential to the specialists, which we want to avoid. As such our envisaged process is one of leaving the specialist rankings as they are in the original specialist reports, but synthesising that plethora of findings into a consolidated and simplified list of key decision-making issues. In what follows below is detailed basis of the significance ratings used in the original specialist studies and the process we are planning to synthesise the specialist findings into key decision-making factors.

### **THE SIGNIFICANCE RATING SYSTEM**

The significance rating system was compiled in accordance with Government Notice R.385, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the Integrated Environmental Management (IEM) Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the DEAT (April 1998).

GIBB notes the Department's clarification comments dated 01 November 2013 with particular reference to point 4.5 (b) and confirm the following:

- Upon consultation with the independent peer reviewer and legal advisor GIBB will not significantly amend the approach to determining significance in relation to the impact assessment methodology. However GIBB will review the consistency and specific criteria ratings of concern for the identified impacts and amend as necessary; and

- Although the approach to the determination of impact significance will not significantly be altered, the approach to the manner in which key decision factors are considered/ determined will be revised as indicated in the discussion to follow.

As such the impact assessment criteria and ratings scales are described in Table 1 below. Thus the significance of an impact on the receiving environment, whether positive or negative, is determined through a process in which a rating of consequence (the potential seriousness of the impact) and probability (the likelihood of the impact occurring) are combined to produce a significance rating. The following criterion was distributed to all the EIA specialists. Although only the criteria below (Table 1) were taken into account in the assessment of impact significance, the degree of confidence in the prediction of impacts, the nature of applicable mitigation measures and legal requirements applicable to the impacts have been described by the specialists.

**Table 1: Impact Assessment Criteria and Rating Scales**

<b>Criteria</b>	<b>Rating Scales</b>	<b>Notes</b>
Nature	Positive	This is an evaluation of the type of effect the construction, operation and management of the proposed NPS development would have on the affected environment.
	Negative	
	Neutral	
Extent	Low	Site-specific, affects only the development footprint
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national
Duration	Low	0-3 years
	Medium	4-8 years
	High	9 years to permanent
Intensity	Low	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Medium	Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	High	Where natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is a high potential that irreplaceable resources will be lost.
Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Low	A combination of any of the following <ul style="list-style-type: none"> <li>• Intensity, duration, extent and impact on irreplaceable resources are all rated low</li> <li>• Intensity is low and up to two of the other criteria are rated medium</li> <li>• Intensity is medium and all three other criteria are rated low</li> </ul>
	Medium	<ul style="list-style-type: none"> <li>• Intensity is medium and at least two of the other criteria are rated medium</li> </ul>
	High	<ul style="list-style-type: none"> <li>• Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration</li> <li>• Intensity is rated high, with all of the other criteria being rated medium or higher.</li> </ul>
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 74 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.

<b>Criteria</b>	<b>Rating Scales</b>	<b>Notes</b>
<i>Significance (all impacts including potential cumulative impacts)</i>	<i>Low</i>	<ul style="list-style-type: none"> <li>• <i>Low consequence and low probability</i></li> <li>• <i>Low consequence and medium probability</i></li> </ul>
	<i>Low to medium</i>	<ul style="list-style-type: none"> <li>• <i>Low consequence and high probability</i></li> <li>• <i>Medium consequence and low probability</i></li> </ul>
	<i>Medium</i>	<ul style="list-style-type: none"> <li>• <i>Medium consequence and medium probability</i></li> <li>• <i>Medium consequence and high probability</i></li> <li>• <i>High consequence and low probability</i></li> </ul>
	<i>Medium to high</i>	<ul style="list-style-type: none"> <li>• <i>High consequence and medium probability</i></li> </ul>
	<i>High</i>	<ul style="list-style-type: none"> <li>• <i>High consequence and high probability</i></li> </ul>

**• Nature**

This is an evaluation of the type of effect the construction, commissioning and operational activities associated with the proposed Nuclear Power Station (NPS) would have on the affected environment. Will the impact (change) in the environment be positive, negative or neutral? This description must include what will be affected and the manner in which the effect will transpire. It is important to describe the impact (the change in the environment), and not the source of the impact.

**• Extent or scale**

This refers to the spatial scale at which the impact will occur. Extent of the impact is described as: low (site-specific - affecting only the footprint of the development), medium (limited to the site and its immediate surroundings and closest towns) and high (regional and national). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. In order to avoid “double counting” specialists have been requested to indicate spatial significance under “intensity” or “impact on irreplaceable resources” but not under “extent” as well.

**• Duration**

The lifespan of the impact is indicated as low (short-term - 0-3 years, typically impacts that are quickly reversible), medium-term (4 – 8 years, reversible over time) and high (long-term, 9 years to permanent, and continue for the operational life span of the power station).

**• Intensity or severity**

This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered? The specialist studies must attempt to quantify the magnitude of the impacts and outline the rationale used.

**• Impact on irreplaceable resources**

This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.

**• Consequence**

The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.

**• Probability of occurrence**

The probability of the impact actually occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. Probability is described as low (improbable), medium (distinct possibility), and high (most likely). It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact. The fact



that an activity will occur does not necessarily imply that an impact will occur. For instance, the fact that a road will be built does not necessarily imply that it will impact on a wetland. If the road is properly routed to avoid the wetland, the impact may not occur at all, or the probability of the impact will be low, even though it is certain that the activity will occur. We have found that many specialists confuse the probability of the impact with the probability of the cause of the impact.

• **Significance**

Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact actually occurring. The following analogy provides an illustration of the relationship between consequence and probability. The use of a vehicle may result in an accident (an impact) with multiple fatalities, not only for the driver of the vehicle, but also for passengers and other road users. There are certain mitigation measures (e.g. the use of seatbelts, adhering to speed limits, airbags, anti-lock braking, etc.) that may reduce the consequence or probability or both. The probability of the impact is low enough that millions of vehicle users are prepared to accept the risk of driving a vehicle on a daily basis. Similarly, the consequence of an aircraft crashing is very high, but the risk is low enough that thousands of passengers happily accept this risk to travel by air on a daily basis.

In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.

• **Degree of confidence in predictions**

Specialists were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.

• **Mitigation measures**

Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

• **Legal requirements**

The specialist identified and listed the relevant South African legislation and permit requirements pertaining to the development proposals. Reference must be provided to the procedures required to obtain permits and describe whether the development proposals have the potential to trigger applicable licensing or permit requirements.

**DECISION MAKING APPROACH**

To apply the criteria and to assist in identifying the appropriate significance rating, an Excel spreadsheet was developed to automatically tally the ratings per criterion so that specialists did not have to painstakingly apply the conditions in the impact criteria and come up with a consequence and significance rating. This also ensured consistency amongst the different specialists.

The result of the above assessment methodology will be linked to authority decision-making by Authorities in the following manner:

- **Low (L):** will not have an influence on the decision to proceed with the proposed project, provided that recommended mitigation measures to mitigate impacts are implemented;
- **Medium (M):** may influence the decision to proceed with the proposed project, provided that recommended measures to mitigate impacts are implemented; and
- **High (H):** must strongly influence the decision to proceed with the proposed project regardless of mitigation measures.

Based on the use of the above described methodology and defined criteria more than 250 impacts, ranging in significance from negative high to positive high were identified and assessed by the Nuclear-1 specialist team.

## THE PROPOSED METHOD OF SYNTHESISING THE KEY IMPACTS

### Categorisation of Impacts

The impacts identified and assessed as discussed above were thereafter consolidated into thematic (i.e. all impacts related to fauna or all impacts related to geohydrology for example) impact categories to make the impact assessment more digestible. This has been done by assessing the significance of the specific mitigated impacts and consolidating them into single categories. By following the precautionary principle, the highest negative or lowest positive significance rating from these impacts were used to create the impact category significance. **This resulted in approximately 40 impact categories.**

Although these consolidated impacts have allowed the impact assessment chapter to be more digestible and understandable, it still did not clearly indicate which categories were the most important to the decision maker when considering this application (i.e. **Key Decision Making Factors**).

### Key Decision Making Factors

A further filter has been developed to identify Key Decision Making Factors (Table 2). The 40 categorised impacts will therefore be ranked according to these criteria to facilitate informed decision-making and to determine the preferred site for the Nuclear Power Station. Very importantly a distinction will be made between decision-making issues and management issues, and this distinction requires further elaboration here. EIAs often suffer the malaise of assessing every issue associated with a proposed development. Many of these issues do not require assessment but can be very effectively managed simply by prescribing credible and practical mitigation. Electrical transformers, for example pose a risk to the environment through rupture and resultant oil spillage. However, the probability of rupture is low and all that is therefore required is to ensure that the transformers are placed in an impermeable bund that will contain the oil if it leaks, with no further assessment required.

A proposed development will, however, always result in residual impacts (risks), which are those risks that remain even with mitigation. The job of the EAP here is to make it clear to the decision-maker which of these residual impacts are potentially significant so that the decision-maker can apply their minds to those specific issues.

**Table 2: Key Decision Making Impact Classification**

<b>Criteria</b>	<b>Rating Scales</b>	<b>Notes</b>
<i>Risk of human morbidity or mortality</i>	<i>A</i>	<i>Potential for fatality or decrease in human life span or quality directly / indirectly due to the NPS.</i>
<i>Loss of Irreplaceable Biophysical / Socio-Economic Resources</i>	<i>B</i>	<i>Loss of irreplaceable resources that contribute to the environment in a biophysical / Socio-economic manner.</i>
<i>Significant Biophysical / Socio-Economic Impacts</i>	<i>C</i>	<i>Impacts that have been assessed and rated in the impact assessment criteria as having a High significance.</i>
<i>Important Biophysical / Socio-Economic Impacts</i>	<i>D</i>	<i>Impacts that have been assessed and rated in the impact assessment criteria as having a Medium to Medium-High significance.</i>

### Conclusion

The determination of impact significance and the identification of a preferred site for the construction and operation of a Nuclear Power Station is summarised in Figure 1 below.

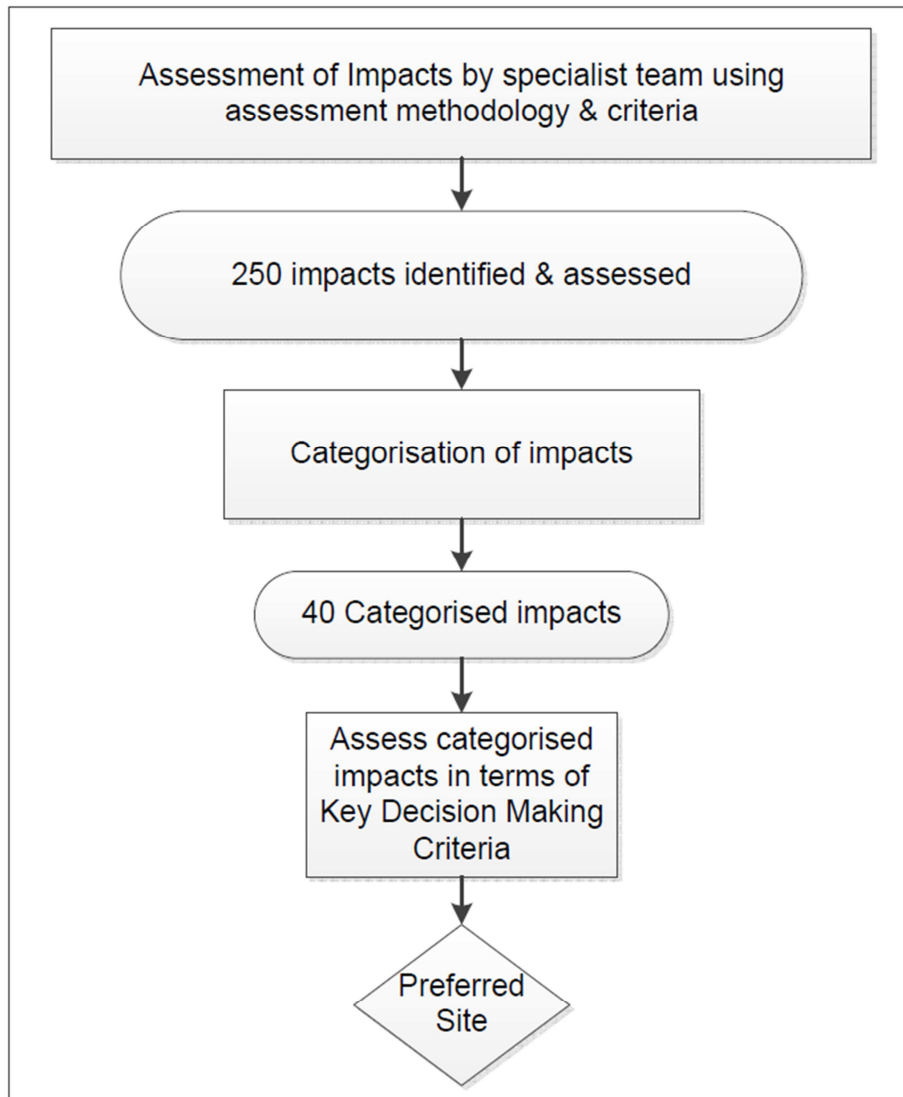


Figure 1: Assessment of Impacts and Determining the Preferred Site for the Nuclear-1 Power Station EIA

An example of how this assessment criterion can be applied is outlined below.

Let us consider impacts identified by the Floral Assessment and the Freshwater Supply Study, assessed and rated according to the impact assessment criteria outline in Table 1.

**Table 3: Impact significance after mitigation**

Impact category	Mitigated impact	Duynfontein	Bantamsklip	Thyspunt
Impacts on Flora:	Loss of important vegetation communities	High	Low	Medium
	Loss of endemic vegetation communities (locate outside of communities)	Medium	Low	Medium
	Loss of locally occurring Red Data species (translocate or grow affected species)	Low	Low	Low
	Loss of coastal habitat due to climate change and rise in sea level (coastal corridor and nuclear power station set back from the coast)	Low	Low	Low
	Cumulative impact of loss of species, habitat and ecosystem functioning (locate footprint outside transverse dune)	Medium	Low	Low

Freshwater Supply	Sea water intrusion during construction	Low	Low	Low
	Installation of beach wells during construction	Low	Low	Low
	Disposal of brine during construction	Low	Low	Low
	Sea water intrusion during operation	Low	Low	Low
	Disposal of brine during operation	Low	Low	Low

Synthesising the above impacts into categories and applying the precautionary principle the following two categories are left:

**Table 4: Summary of Consolidated Impacts**

Impact category	Duynfontein	Bantamsklip	Thyspunt
Impacts on Flora	High	Low	Medium
Freshwater Supply	Low	Low	Low

Applying the Key Decision Making Criteria outlined in Table 2 results in the following:

**Table 5: Key Decision Making Factors**

Impact category	Key Decision Making Criteria		
	Duynfontein	Bantamsklip	Thyspunt
Impacts on flora	C	-	D

This therefore implies that the impacts on flora at Duynfontein are more significant and is regarded as a greater decision making factor than at Thyspunt or Bantamsklip.

Based on the above assessments and filters, the EAP believes that the project's impact will be fully assessed and the significance of these impacts will be disseminated in a digestible form for interested and affected parties and decision makers. None of the original assessments will be lost and will still be available for review by stakeholders.

#### Site selection

Several different ways of ranking the sites have been explored. None of these ranking systems are perfect, as they all require subjective weighting factors. It is likely that the key decision-making factors approach described above will markedly improve the robustness of the site ranking, but there is still the risk of furious debate regarding the weightings chosen. It is important to remember that none of the specialist assessments identified fatal flaws at any of the remaining sites, and both the proposed sites remain viable sites for nuclear power station development, either for Nuclear 1, which is now proposed, or for some future power station. As such, GIBB are considering a site selection argument that is based on the principle of neither site presenting fatal flaws and as such the site selected is the one that provides the greatest immediate return from an electricity supply point of view. GIBB would argue strongly that it is a viable form of site ranking and simplifies the basis of the decision considerably. Most importantly it is an approach that provides a more transparent and direct basis for decision-making. GIBB have no doubt that there will still be vociferous protest to the siting of the Nuclear Power Station but believe that this would constitute a more robust and defensible approach, than an endless debate about what weightings to apply to the assessment ratings. We would like to solicit your views on this approach.

In terms of the project's EIA execution programme, GIBB plans to make the Revised Draft EIR Version 2 available for public comment and review during the first quarter of 2015 and is proceeding with the Impact Assessment approach as described above. In supporting the progress on the project, it is requested that the Department furnish GIBB with feedback in this regard by **20 February 2015**, in the event that the Department disagrees with the approach proposed above.

Yours faithfully  
for GIBB (Pty) Ltd



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Elisabeth Nortje

cc. Ms Deidre Herbst  
Ms Lorraine Ndala  
Mr Tobile Bokwe  
Mr Mervin Theron  
Mr Sean O'Beirne

Our Ref: J31314  
DEA Ref: 12/12/20/944  
NEAS Ref: DEAT/EIN918/2008



01 July 2015

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Dear Ms Solomons

## **IMPACT ASSESSMENT METHODOLOGY: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT VERSION 2 FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE**

This letter is referenced to the meeting held with the National Department of Environmental Affairs ("the Department") and GIBB (Pty) Ltd (GIBB) on 16 April 2013 regarding the Department's comments on the Nuclear-1 Draft Environmental Impact Assessment Report, dated 25 January 2013, and the subsequent meeting held with the Department and GIBB on 15 May 2015.

During the first meeting held, the Department requested GIBB to revise the impact assessment criteria used in the report so that there is a more logical and defensible criteria for assessment of significance and identification of a preferred site. During the follow up meeting an updated Impact Assessment Methodology was thus presented to the Department. The Department recognised, in this meeting, that the proposed methodology was more robust than that applied in the Revised DEIR (version 1), however that it was now too mechanical in nature. GIBB has since revised this approach in order to reduce the mechanical nature of the assessment and in an effort to synthesise out the actual consequences, expressed as a measure of risk, which the Department must consider during decision making.

As such the revised approach to the impact assessment is discussed in the sections below.

Furthermore as agreed in the meeting of 15 May 2015, getting the specialists to revise their original significance rankings will be a major logistical challenge, as well as being very disruptive to the consultation process. Such changes may be perceived as unduly influential to the specialists, which should be avoided. Therefore our revised assessment process is one of leaving the specialist rankings as they are in the original specialist reports, but synthesising that plethora of findings into a consolidated and simplified list of key decision-making consequences. In what follows below is thus a detailed basis of the significance ratings used in the original specialist studies and the revised process we are planning to use in order to synthesise the specialist findings into key decision-making consequences.

### **THE SIGNIFICANCE RATING SYSTEM**

The significance rating system was compiled in accordance with Government Notice R.385, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the Integrated Environmental Management (IEM) Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the DEAT (April 1998).

GIBB notes the Department's clarification comments dated 01 November 2013 with particular reference to point 4.5 (b) and still confirm the following:



- Upon consultation with the independent peer reviewer and legal advisor GIBB will not significantly amend the approach to determining significance in relation to the impact assessment methodology. However GIBB will review the consistency and specific criteria ratings of concern for the identified impacts and amend as necessary; and
- Although the approach to the determination of impact significance will not significantly be altered, the approach to the manner in which key decision factors are considered/ determined will be revised as indicated in the discussion to follow.

As such the impact assessment criteria and ratings scales are described in Table 1 below. Thus the significance of an impact on the receiving environment, whether positive or negative, is determined through a process in which a rating of consequence (the potential seriousness of the impact) and probability (the likelihood of the impact occurring) are combined to produce a significance rating. The following criterion was distributed to all the EIA specialists. Although only the criteria below (Table 1) were taken into account in the assessment of impact significance, the degree of confidence in the prediction of impacts, the nature of applicable mitigation measures and legal requirements applicable to the impacts have been described by the specialists.

**Table 1: Impact Assessment Criteria and Rating Scales**

<b>Criteria</b>	<b>Rating Scales</b>	<b>Notes</b>
Nature	Positive	This is an evaluation of the type of effect the construction, operation and management of the proposed NPS development would have on the affected environment.
	Negative	
	Neutral	
Extent	Low	Site-specific, affects only the development footprint
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national
Duration	Low	0-3 years
	Medium	4-8 years
	High	9 years to permanent
Intensity	Low	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Medium	Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	High	Where natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is a high potential that irreplaceable resources will be lost.
Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	Low	A combination of any of the following <ul style="list-style-type: none"> <li>• Intensity, duration, extent and impact on irreplaceable resources are all rated low</li> <li>• Intensity is low and up to two of the other criteria are rated medium</li> <li>• Intensity is medium and all three other criteria are rated low</li> </ul>
	Medium	<ul style="list-style-type: none"> <li>• Intensity is medium and at least two of the other criteria are rated medium</li> </ul>
	High	<ul style="list-style-type: none"> <li>• Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration</li> <li>• Intensity is rated high, with all of the other criteria being rated medium or higher.</li> </ul>

<b>Criteria</b>	<b>Rating Scales</b>	<b>Notes</b>
<i>Probability (the likelihood of the impact occurring)</i>	<i>Low</i>	<i>It is highly unlikely or less than 50 % likely that an impact will occur.</i>
	<i>Medium</i>	<i>It is between 50 and 74 % certain that the impact will occur.</i>
	<i>High</i>	<i>It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.</i>
<i>Significance (all impacts including potential cumulative impacts)</i>	<i>Low</i>	<ul style="list-style-type: none"> <li>• <i>Low consequence and low probability</i></li> <li>• <i>Low consequence and medium probability</i></li> </ul>
	<i>Low to medium</i>	<ul style="list-style-type: none"> <li>• <i>Low consequence and high probability</i></li> <li>• <i>Medium consequence and low probability</i></li> </ul>
	<i>Medium</i>	<ul style="list-style-type: none"> <li>• <i>Medium consequence and medium probability</i></li> <li>• <i>Medium consequence and high probability</i></li> <li>• <i>High consequence and low probability</i></li> </ul>
	<i>Medium to high</i>	<ul style="list-style-type: none"> <li>• <i>High consequence and medium probability</i></li> </ul>
	<i>High</i>	<ul style="list-style-type: none"> <li>• <i>High consequence and high probability</i></li> </ul>

**• Nature**

This is an evaluation of the type of effect the construction, commissioning and operational activities associated with the proposed Nuclear Power Station (NPS) would have on the affected environment. Will the impact (change) in the environment be positive, negative or neutral? This description must include what will be affected and the manner in which the effect will transpire. It is important to describe the impact (the change in the environment), and not the source of the impact.

**• Extent or scale**

This refers to the spatial scale at which the impact will occur. Extent of the impact is described as: low (site-specific - affecting only the footprint of the development), medium (limited to the site and its immediate surroundings and closest towns) and high (regional and national). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. In order to avoid “double counting specialists have been requested to indicate spatial significance under “intensity” or “impact on irreplaceable resources” but not under “extent” as well.

**• Duration**

The lifespan of the impact is indicated as low (short-term - 0-3 years, typically impacts that are quickly reversible), medium-term (4 – 8 years, reversible over time) and high (long-term, 9 years to permanent, and continue for the operational life span of the power station).

**• Intensity or severity**

This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered? The specialist studies must attempt to quantify the magnitude of the impacts and outline the rationale used.

**• Impact on irreplaceable resources**

This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.

**• Consequence**

The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.



- **Probability of occurrence**

The probability of the impact actually occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. Probability is described as low (improbable), medium (distinct possibility), and high (most likely). It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact. The fact that an activity will occur does not necessarily imply that an impact will occur. For instance, the fact that a road will be built does not necessarily imply that it will impact on a wetland. If the road is properly routed to avoid the wetland, the impact may not occur at all, or the probability of the impact will be low, even though it is certain that the activity will occur. We have found that many specialists confuse the probability of the impact with the probability of the cause of the impact.

- **Significance**

Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact actually occurring. The following analogy provides an illustration of the relationship between consequence and probability. The use of a vehicle may result in an accident (an impact) with multiple fatalities, not only for the driver of the vehicle, but also for passengers and other road users. There are certain mitigation measures (e.g. the use of seatbelts, adhering to speed limits, airbags, anti-lock braking, etc.) that may reduce the consequence or probability or both. The probability of the impact is low enough that millions of vehicle users are prepared to accept the risk of driving a vehicle on a daily basis. Similarly, the consequence of an aircraft crashing is very high, but the risk is low enough that thousands of passengers happily accept this risk to travel by air on a daily basis.

In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.

- **Degree of confidence in predictions**

Specialists were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.

- **Mitigation measures**

Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

- **Legal requirements**

The specialist identified and listed the relevant South African legislation and permit requirements pertaining to the development proposals. Reference must be provided to the procedures required to obtain permits and describe whether the development proposals have the potential to trigger applicable licensing or permit requirements.

## **DECISION MAKING APPROACH**

To apply the criteria and to assist in identifying the appropriate significance rating, an Excel spreadsheet was developed to automatically tally the ratings per criterion so that specialists did not have to painstakingly apply the conditions in the impact criteria and come up with a consequence and significance rating. This also ensured consistency amongst the different specialists.

The result of the above assessment methodology will be linked to authority decision-making by Authorities in the following manner:

- **Low (L):** will not have an influence on the decision to proceed with the proposed project,

- provided that recommended mitigation measures to mitigate impacts are implemented;
- **Medium (M):** may influence the decision to proceed with the proposed project, provided that recommended measures to mitigate impacts are implemented; and
- **High (H):** must strongly influence the decision to proceed with the proposed project regardless of mitigation measures.

**Based on the use of the above described methodology and defined criteria more than 250 impacts, ranging in significance from negative high to positive high were identified and assessed by the Nuclear-1 specialist team.**

### **THE PROPOSED METHOD OF SYNTHESISING THE KEY IMPACTS**

As stated by the Department in the meeting of 15 May 2015, categorising these 250 impacts into the 40 impact categories by applying the conservative approach was too mechanical in nature. As such the approach has been changed to interrogate the specialist studies and identify and describe the collective implications of all the impacts presented. In the process a distinction is now made between the collective implication of the various impacts (e.g. reduced threatened species populations) and the causes of the implication (e.g. loss of habitat, road mortality, power line mortality and off site pollution). These implications will then be presented as either potential environmental costs (where the implications are negative) or as potential environmental benefits (where the implications are positive).

The best way of expressing these Environmental cost / benefit implications for decision-making is to present them as risks. Risk is defined as the consequence (implication) of an event multiplied by the probability of that event. Many risks are taken on a daily basis because even if the consequence of the event is serious the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, is potentially death but the probability of such an event happening is so low that parachutists are prepared to take that risk and hurl themselves out of an airplane. The risk is low because the probability of the event is low even if the consequence is potential severe.

It is also necessary to distinguish between the event itself (as the cause) and the consequence. Again using the parachute example, the consequence of concern in the event that the parachute does not open is serious injury or death, but it does not necessarily follow that if a parachute does not open that the parachutist will die. Various contingencies are provided to minimise the probability of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute. In risk terms this means distinguishing between the inherent risk (the risk that a parachutist will die if the parachute does not open) and the residual risk (the risk that the parachutist will die if the parachute does not open but with the contingency of a reserve parachute).

#### ***Consequence***

The ascription of significance for decision-making becomes then relatively simple. It requires the consequences to be ranked and a probability to be defined of that consequence. In Table 2 below a scoring system for consequence ranking is shown. Two important features should be noted in the table, namely that the scoring doubles as the risk increases and that there is no equivalent 'high' score in respect of benefits as there is for the costs. This high negative score serves to give expression to the potential for a fatal flaw where a fatal flaw would be defined as an impact that cannot be mitigated effectively and where the associated risk is accordingly untenable. Stated differently the high score on the costs, which is not matched on the benefits side, highlights that such a fatal flaw cannot be 'traded off' by a benefit and would render the proposed project to be unacceptable.

**Table 2: Table showing the ranking of consequence**

<b>Residual risk (Cost)</b>	<b>Rating</b>	<b>Score</b>
Human health – morbidity / mortality, loss of species	High	16
Reduced faunal populations, loss of livelihoods, individual economic loss	Moderate – high	8
Reduction in environmental quality – air, soil, water. Loss of habitat, loss of heritage, amenity	Moderate	4
Nuisance	Moderate – low	2
Negative change – with no other consequences	Low	1

Environmental Benefits	Rating	Score
Net improvement in human welfare	Moderate – high	8
Improved environmental quality – air, soil, water. Improved individual livelihoods	Moderate	4
Economic Development	Moderate – Low	2
Positive change – with no other consequences	Low	1

### Probability

In Table 3 below, a set of probability descriptors is presented that can be used to characterise the likelihood of the costs and benefits occurring.

**Table 3: Probability categories and definitions**

Likelihood Descriptors	Definitions	Rating
Improbable	The possibility of the impact occurring is negligible and only under exceptional circumstances.	0.1
Unlikely	The possibility of the impact occurring is low with less than 20 % chance of occurring. The impact has not occurred before.	0.2
Probable	The impact has a 20 – 50 % chance of occurring. Only likely to happen once every three or more years.	0.5
Highly Probable	It is most likely that the impact will occur. A 51 – 75 % chance of occurring.	0.75
Definite	More than 75% chance of occurrence. The impact occurs regularly.	1

### Residual risk

The residual risk is then determined by the consequence and the probability of that consequence. The residual risk categories are shown in Table 4 where consequence scoring is shown in the rows and probability in the columns. The implications for decision-making of the different categories are shown in Table 5.

**Table 4: Residual risk categories**

<b>Consequence</b>	<b>16</b>	1.6	3.2	8	12	16
	<b>8</b>	0.8	1.6	4	6	8
	<b>4</b>	0.4	0.8	2	3	4
	<b>2</b>	0.2	0.4	1	1.5	2
	<b>1</b>	0.1	0.2	0.5	0.75	1
		<b>0.1</b>	<b>0.2</b>	<b>0.5</b>	<b>0.75</b>	<b>1</b>
		<b>Probability</b>				

**Table 5: Implications for decision-making of the different residual risk categories shown in Table 4.**

Rating	Nature of implication for Decision – Making
Low	Project can be authorised with low risk of environmental degradation
Moderate	Project can be authorised but with conditions and routine inspections
High	Project can be authorised but with strict conditions and high levels of compliance and enforcement
Fatally Flawed	The project cannot be authorised

Based on the above assessments and filters, the EAP believes that the project's impact will be fully assessed and the significance of these impacts will be disseminated in a digestible form for interested and affected parties and decision makers. None of the original assessments will be lost and will still be available for review by stakeholders.

A preliminary example of this is outline in the text box below:

## **1. PUBLIC HEALTH AND SAFETY RISK**

### **1.1. Overview**

A key concern with any large-scale industrial facility is the risks that such a facility poses to public health and safety. In the case of a nuclear power station these concerns are even more acute due to the presence of radioactive material (enriched uranium) and the associated threat of release of ionising radiation. The defence in depth principles of a modern nuclear power station mean that under normal operating circumstances the release of ionising radiation would be negligible and well less than background radiation levels. That notwithstanding, there are concerns about normal operating conditions being potentially compromised, resulting in abnormal operating conditions and associated potential releases of ionising radiation. For the purpose of the proposed NPP, the following possible causes of uncontrolled release of ionising radiation have been identified as:

- A process upset;
- A failure in the structural integrity of the buildings in which the radioactive material is contained;
- Flooding of the facilities either by tsunami or through high rainfall events; and,
- A combination of such events.

### **1.2. Failure in the structural integrity of the buildings**

Potential causes of structural failure have been identified as geotechnical stability, flooding (hydrology) and sea level change and tsunamis.

#### **1.2.1. *Geo-technical stability***

A key element in siting a nuclear power station is geotechnical stability. Much of the defence in depth principles are dependent on the power station structure remaining intact and so it is important to understand the:

- Competence of the material on which the structures will be built; and,
- Earthquake occurrence (seismicity);

Despite both proposed sites requiring the construction of the NPS on thick sand, various well-tried and tested construction techniques can be used to ensure that there is negligible risk of structural failure. Risks of surface rupture, subsurface instability and volcanic activity have all been assessed to be negligible, as changes in geology are considered improbable. As such the competence of the underlying material is not considered a key differentiating factor between the two sites, nor a key decision-making issue and is not further considered in this chapter.

In respect of seismicity, Peak Ground Acceleration (PGA) is used to characterize the risk of structural damage. As opposed to measuring the intensity of earthquakes (which is what is done with the Richter scale), PGA is a measure of the degree to which the ground shakes during an earthquake and as such the risk of structural damage to buildings. PGA is measured in g, which is the acceleration due to gravity (similar also to g-force). For this assessment a threshold of 0.3 g has been used to define a safe seismic risk value for a standard NPS without the need for significant additional earthquake protection. The PGA value for Thyspunt has been determined at 0.16 g and for Duynefontein 0.3 g rendering the Thyspunt site preferable in terms of seismic risk.

**1.2.2. Flooding risk (hydrology)**

Flood risk is a principally a function of extreme rainfall events and so it is necessary to ascertain the probability of such events and to ensure that the NPS is designed for such events. The probability of extreme rainfall events is typically presented as a ‘return period’, which refers to the maximum amount of rainfall (both volume and intensity) that could occur in a defined period. For example, a bridge may be designed for a 1 in a 100-year flood, which means the maximum amount of rainfall that could fall in a 100 year period. Typically return periods of 1 in 10000 years are used in designing an NPS for the operational period of the power station, whereas shorter return periods can be used for the construction phase. The return periods become moot, however, as it is impossible to calculate the 1:10000 rain event and so attention turn to ensuring that the NPS is sited to avoid major water courses (drainage lines) that could otherwise potentially flood the power station. The absence of such watercourses at both Duynefontein and Thyspunt render the risk of structural or operational failure at the sites as a result of flooding to be improbable.

**1.2.3. Sea level change and tsunamis**

The risk of sea level change is accounted for by designing for extreme sea levels and tsunamis. Such design requirements mean that the base levels of the two proposed sites should be at least 10.54 and 14,9 meters above mean sea level (mamsl) for Duynefontein and Thyspunt respectively. Provided the base levels are at or above these levels the risk of flooding as a result of high seas is considered to be improbable.

**Table 1: Determination of significance for decision-making in terms of public health and safety.**

Consequence severity	Score	Causes	Change	Likelihood		Significance for decision-making
				Of cause	Of consequence	
Public health and safety	16	Surface rupture	Negative	20%	20%	3,2
		Subsurface stability	Negative	20%		
		Volcanic activity	Negative	10%		
		Unstable soil/geological unit	Negative	20%		
		Flooding as a result of additional runoff or exposing groundwater	Negative	50%		
		Flood damage to access routes	Negative	50%		
		Soil liquefaction damage to access routes	Negative	20%		
		Seismicity	Negative	20%		

This therefore implies that when considering the consequence to Public Health and Safety the potential risk of this consequence occurring when establishing a Nuclear Power Station, the project can be authorised but with conditions and routine inspections.

**Site selection**

As agreed in the meeting of 15 May 2015, several different ways of ranking the sites have been explored. None of these ranking systems are perfect, as they all require subjective weighting factors. It is likely that the key decision-making consequences approach described above will markedly improve the robustness of the site ranking whilst not being mechanical in nature, but there is still the risk of furious debate regarding the weightings chosen. It is important to remember that none of the specialist assessments identified fatal flaws at any of the remaining sites, and both the proposed sites remain viable sites for nuclear power station development, either for Nuclear 1, which is now proposed, or for some future power station. As such, GIBB reiterates that it is considering a site selection argument that is based on the principle of neither site presenting fatal flaws and as such the site selected is the one that provides the greatest immediate return from an electricity supply point of view. GIBB would argue strongly that it is a viable form of site ranking and simplifies the basis of the decision considerably. Most importantly it is an approach that provides a more transparent and direct basis for decision-making. GIBB have no doubt that there will still be vociferous protest to the siting of the Nuclear Power Station but believe that this would constitute a more robust and defensible approach, than an endless debate about what weightings to apply to the assessment ratings.

In terms of the project's EIA execution programme, GIBB plans to make the Revised Draft EIR Version 2 available for public comment and review before the last quarter of 2015 and is proceeding with the Impact Assessment approach as described above. In supporting the progress on the project, it is requested that the Department furnish GIBB with feedback in this regard by **16 July 2015**, in the event that the Department disagrees with the approach proposed above.

Yours faithfully  
for GIBB (Pty) Ltd



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Elisabeth Nortje

cc. Ms Deidre Herbst  
Ms Lorraine Ndala  
Mr Tobile Bokwe  
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## environmental affairs

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### PER EMAIL / MAIL

Dear Ms Nortje

### **IMPACT ASSESSMENT METHODOLOGY: THE REVISED DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT VERSION 2 FOR THE PROPOSED CONVENTIONAL NUCLEAR-1 POWER STATION AND ASSOCIATED INFRASTRUCTURE**

Your correspondence dated 10 February 2015 and 1 July 2015, as well as the meeting held between Department of Environmental Affairs (DEA), GIBB (Pty) Ltd, SE Solutions and the Chairperson of the Advisory Panel (Telecall) on 05 May 2015, refer. The Department hereby provides written feedback on the proposed impact assessment methodology that must be used in the revised draft Environmental Impact Assessment Report (EIR) - Version 2, as per request. It is critical to note that the development and application of the assessment methodology is the responsibility of the Environmental Assessment Practitioner (EAP) and must be owned by the EAP.

The Department has considered and reviewed the summary provided on the proposed impact assessment methodology for the abovementioned application. As discussed in the meeting, the Department is satisfied that the proposed methodology appears to be more robust and consistent. One of the Department's main concerns with the approach used previously relates to the determination of the key decision factors, the inconsistent and inaccurate application thereof in the draft EIR - Version 1. It is important that the identified impacts and the associated mitigation measures must be clearly defined and the mitigation hierarchy must be used in the identification of mitigation measures. In addition, the EAP must ensure that the proposed methodology is consistently applied throughout the impact assessment process and across the three identified sites, i.e. comparatively assessed as agreed to in the meeting.

With reference to the revision of the specialist impact assessment ratings (level of significance), it is critical that the independence of the respective specialist is maintained, but the specialist must verify any changes in their findings, if any in the consolidated revised draft EIR -Version 2 and provide input in the key decision-making factors identified by the EAP. More importantly, as discussed in our meeting, the information presented in the specialist findings must be valid and current. In instances, where this is not possible; if any, a detailed motivation must be provided in the report.

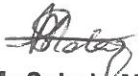
M.S

Furthermore, the report must indicate the changes which were made between the draft EIR – Version 1 and Version 2. The EAP must consider the NEMA Regulations dated 8 December 2014, to confirm any additional listed activities that may be triggered. Should any of the current listed activities be triggered, the impacts of these activities must be considered and assessed in the report. The report must highlight where these activities are discussed and assessed.

In addition, you are requested to provide a table which indicate all the requirements of the Department as part of the Environmental Impact Assessment (EIA) process, together with an explanation of how these requirements have been addressed. Should you fail to fully address all EIA requirements, please highlight them in the report and provide a comprehensive rational as to why these requirements are not addressed.

This Department reserves the right to revise or withdraw comments or request further information from you based on any information that might be received.

Yours faithfully



**Mr Sabelo Malaza**  
**Chief Director: Integrated Environmental Authorisations**  
**Department of Environmental Affairs**

Date: 27/08/2015



Our Ref: J31314



04 April 2014

Ms Milicent Solomons  
Director: Integrated Environmental Authorisations  
Department of Environmental Affairs  
Private Bag X447  
Pretoria  
0001

Dear Milicent

**Tshwane**

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**PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE  
ENVIRONMENTAL IMPACT ASSESSMENT (DEA Ref. No: 12/12/20/944) – CHANGE IN  
ENVIRONMENTAL ASSESSMENT PRACTITIONER**

Due to the resignation of Mr Heydenrych from the Environmental Sector at GIBB (Pty) Ltd I will take over the role of Environmental Assessment Practitioner (EAP) for the Environmental Impact Assessment for the proposed Nuclear-1 power station and associated infrastructure. The change in EAP is effective from 01 April 2014. From this date I will take on all responsibilities of the position.

Yours faithfully  
for GIBB (Pty) Ltd

A handwritten signature in black ink, appearing to read "Elisabeth Nortje".

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Elisabeth Nortje

cc. Deidre Herbst - Eskom



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GIBB Holdings Reg: 2002/019792/02  
Directors: D. Mkhwanazi (Chairman), R. Vries, Y. Frizlar, B. Hendricks, M. Mayat

GIBB (Pty) Ltd, Reg: 1992/007139/07 is a wholly owned subsidiary of GIBB Holdings.  
A list of divisional directors is available from the company secretary.



Our Ref: J31314



18 March 2013

Ms. Milicent Solomons  
Director  
Department Environmental Affairs  
Private Bag X447  
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0001

**Cape Town**

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Dear Milicent

**PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE  
ENVIRONMENTAL IMPACT ASSESSMENT (DEA Ref. No: 12/12/20/944) – CHANGE IN  
ENVIRONMENTAL ASSESSMENT PRACTITIONER**

Following significant and ongoing restructuring of the Environmental Sector at GIBB (Pty) Ltd I have been instructed to withdraw as the Environmental Assessment Practitioner (EAP) for the Environmental Impact Assessment for the proposed Nuclear-1 power station and associated infrastructure. The change in EAP, to Mr. Reuben Heydenrych, will be effective from 01 April 2013. From this date Mr. Heydenrych will take on all responsibilities of the position.

Thank you for your understanding.

Yours faithfully  
for GIBB (Pty) Ltd

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Jaana-Maria Ball

cc. Mark Gordon – DEA  
Deidre Herbst - Eskom



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GIBB Holdings Reg: 2002/019792/02  
Directors: R. Vries (Chairman), Y. Frizlar, B. Hendricks, M. Mayat  
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