

## ESKOM HOLDINGS LIMITED

### ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR A PROPOSED NUCLEAR POWER STATION AND ASSOCIATED INFRASTRUCTURE DEA REF. No.:12/12/20/944

**EIA Phase Public Meeting:  
Review of Draft Environmental Impact Report**

March / April 2010


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## PROPOSED AGENDA

1. Sign attendance register and discussion with team: 17:00 – 17:50
2. Welcome and introductions: 18:00 – 18:10
3. Presentation of EIA and EMP findings: 18:10 – 19:00
4. Discussion: 19h00 – 19:50
5. Way forward and close: 19:50 – 20:00

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## MEETING CONDUCT

- Please wait for the discussion session to ask questions
- Introduce yourselves prior to asking a question and indicate your specific interest
- You are welcome to ask the question in your mother tongue. Presentations will be in English
- One person at a time
- Work through the facilitator
- Show respect
- Focus on the issue not the person
- Be constructive
- Agree to disagree

**Please switch  
off all cell  
phones!**


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## MEETING OBJECTIVES

- The focus of the meeting is to provide an opportunity for Interested and Affected Parties (I&APs) to comment on the findings of the EIA and the Draft Environmental Impact Assessment Report (EIR)
- Provide an opportunity for I&APs to seek further clarity on the proposed project, the EIA phase and the Draft EIR
- Provide I&APs with an opportunity for interaction with the EIA team
- Recording of issues - the proceedings will be recorded and used to compile meeting minutes. Comments will be included in the Issues and Response Report (IRR) and changes will be made to the Final EIR, where necessary


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## KEY ISSUES

- Some people are opposed to and others are in favour of a nuclear power station at Bantamsklip, Thyspunt and Duynefontein
- Concerns about the potential impacts on human health and safety
- Local residents share a deep-felt connection to the area and have a strong “sense of place”
- A power station could potentially be unsightly
- Tourism is linked to conservation and preservation of the coastline


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## KEY ISSUES

- Marine life could potentially be adversely affected by altered sea temperature and turbulence caused by inflow and output of sea water to the plant
- Concern that commercial and recreational fishing may be negatively impacted
- Light pollution
- Concerns about potential drop in property values
- Concern about cost of constructing a power station
- Some people expressed a lack of trust in the EIA
- Storage of hazardous waste
- Renewable ('green') energy (e.g. wind, solar) vs. nuclear

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## PROJECT MOTIVATION

- Increasing demand for electricity (> 4% growth per annum)
- Projected requirement for more than 40 000 MW of new electricity generating capacity over the next 20 years
- In SA only coal and nuclear power are solutions for base load generation, while gas turbines, hydroelectric power stations and pumped storage schemes are used for peaking and emergency electricity generation


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## PROPOSED ACTIVITY

- Eskom proposes the construction, operation and decommissioning of a conventional nuclear power station and associated infrastructure either in the Eastern or Western Cape
- A nuclear power station of the Pressurised Water Reactor (PWR) type technology e.g. Koeberg Power Station
- The transmission power lines are subject to separate environmental authorisation processes


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## TRANSMISSION (TX) LINE EIAs

- Bantamsklip – Scoping phase has been extended to include Multi-stakeholder Workshops and additional public consultation. Revised Draft Scoping Report will be made available for public comment
- Thyspunt – Scoping Report accepted by Authorities and EIA phase has commenced
- Duynefontein – Scoping Report accepted by Authorities and EIA phase has commenced


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## PROJECT BACKGROUND

- The power station and directly associated infrastructure will require approximately 31 ha
- The footprint assessed makes provision for the potential future expansion of a power station, to 10 000 MW or the maximum carrying capacity
- The proposed nuclear power station will include nuclear reactor, turbine complex, spent fuel, nuclear fuel storage facilities, waste handling facilities, intake and outfall pipelines, desalination plant and auxiliary service infrastructure
- Should the proposed project be authorised, it is anticipated that construction of the station could commence in 2011 with the first unit being commissioned in 2018

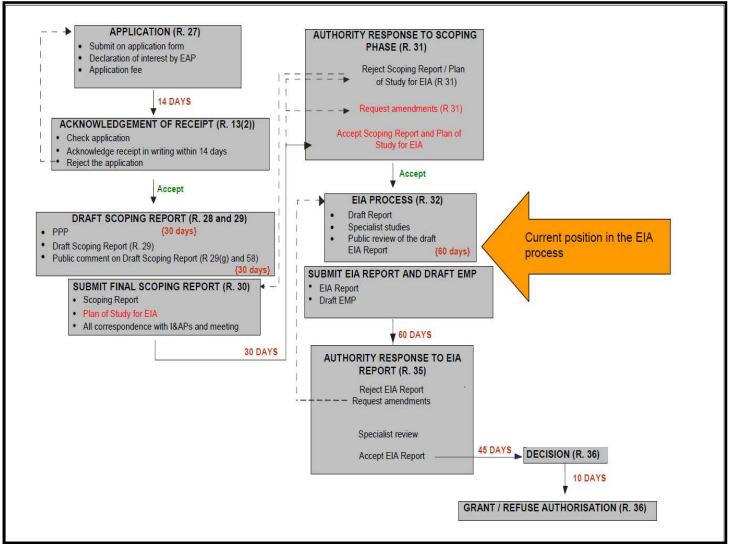
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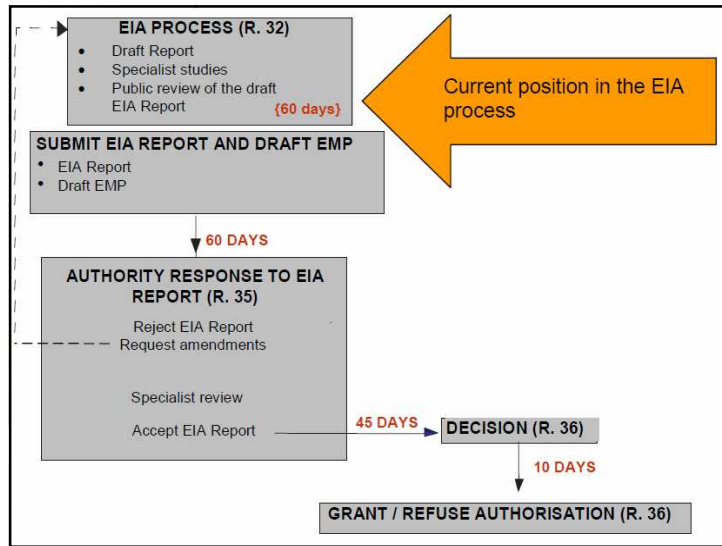


## ENVELOPE OF CRITERIA

- Detailed description of proposed nuclear plant is not available, as preferred supplier has not been selected
- Approach used has been to specify enveloping environmental and other relevant requirements, to which the power station design and placement on site must comply
- Enveloping criteria represent the most conservative parameters associated with the various plant alternatives within the available PWR technology

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## SCOPING PHASE

EIA process comprises the Scoping and EIA phases

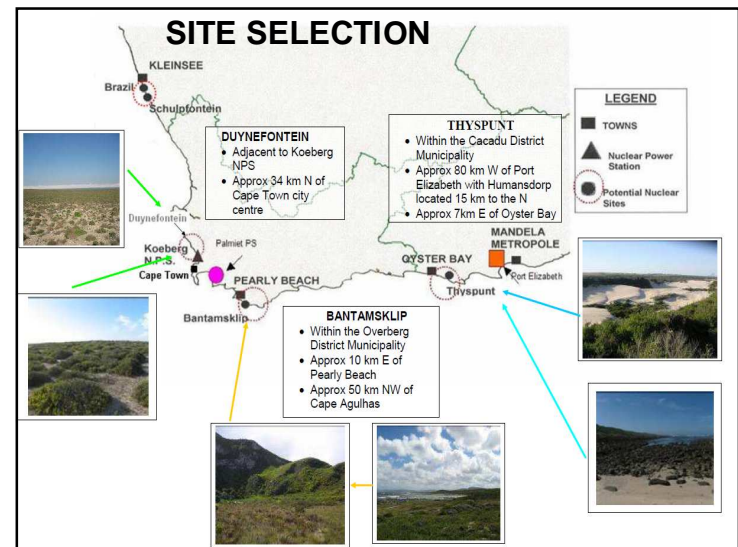
- Approval of the Scoping Report**
  - Application was submitted to the Department of Environmental Affairs (DEA) in May 2007 and amended in July 2008 for a single nuclear power station of up to 4 000 MW
  - DEA approved the Scoping Report - November 2008
  - In mid 2009, after publication of the amended EIA Regulations, Eskom announced that it was considering amending its application to include more than one nuclear power station. Eskom subsequently decided not to pursue the amendment of the application


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## SCOPING PHASE

- In line with Eskom's intention to investigate the potential development of up to 20 000 MW of nuclear power generating capacity an application for the second nuclear power station may be submitted soon after the submission of the Final EIR for Nuclear-1
- Approval of the Plan of Study for EIA**
  - The Plan of Study (PoS) for EIA was made available for two rounds of public comment
  - DEA approved Final PoS for EIA - January 2010
  - The Scoping phase of the EIA process is complete

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## ASSESSMENT OF IMPACTS

- The potential impacts assessed were based on:
  - Issues identified by I&APs during the public participation process (PPP)
  - Issues identified by specialists through research
  - Experience of relevant specialists with projects of a similar nature or in a similar environment
  - Consultation with local specialists
  - Environmental resources and conditions identified during site surveys


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## METHODOLOGY

- Independent specialists assessed potential positive and negative impacts with and without mitigation
- According to the specialists, all potential negative impacts can be mitigated
- There are no fatal flaws at any of the alternative sites

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## SPECIALIST STUDIES

- Physical Impacts
  - Geology and geological risk
  - Seismological risk**
  - Geo-hydrology
  - Geotechnical characteristics
- Biophysical Impacts
  - Dune geomorphology**
  - Flora**
  - Fauna (**Invertebrate and Vertebrate**)
  - Hydrology
  - Freshwater ecosystems**
  - Oceanographic conditions
  - Marine biology**
  - Air quality
  - Assessment of the 1:100 year floodline


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## SPECIALIST STUDIES

- Socio-economic Impacts
  - Social**
  - Economic**
  - Noise
  - Visual
  - Heritage and cultural resources**
  - Waste
  - Tourism**
- As per the NNR / DEA co-operative agreement, a number of specialist studies related to human health risk and safety were commissioned and included in this EIR for information (4 studies)

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**SPECIALIST STUDY RESULTS**

- **Seismological Risk**

Seismic studies indicate that the design basis for the respective sites in terms of peak ground acceleration values (PGA) are as follows:

- Duynfontein – PGA ~0.30 g
- Bantamsklip - PGA ~0.23 g
- Thyspunt - PGA ~0.16 g

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**SPECIALIST STUDY RESULTS**

- **Impacts on Dune Geomorphology**

- Groundwater does not 'daylight' at the Duynfontein or Bantamsklip sites: access roads and transmission lines can be built across the mobile dunes at these sites
- Access roads and transmission lines at Duynfontein can be built across the artificially vegetated and vegetated parabolic dunefields – provided dunes are stabilised
- The interaction between dune systems and wetlands is complex at Thyspunt, since groundwater 'daylights' in many inter-dune areas

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**SPECIALIST STUDY RESULTS**


- **Impacts on Dune Geomorphology**

- As a result of the location of the proposed construction of transmission lines, haul roads and conveyor belts between the nuclear power station in the south and the HV yard in the north, the negative potential impacts on dune geomorphology at Thyspunt are more extensive than at the other two sites

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## SPECIALIST STUDY RESULTS

- **Impacts on Flora**
  - Bantamsklip will experience the least potential negative impact on plant communities and species, as the ecosystems on this site are fairly common along this section of coastline, provided that the power station is situated on the eastern half of the EIA corridor, away from the limestone fynbos
  - Thyspunt has by far the greatest diversity of vegetation communities, including extensive and highly sensitive wetlands

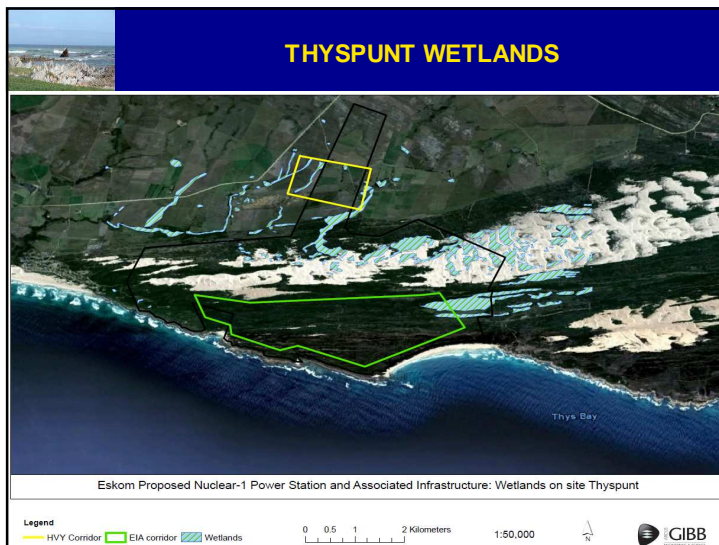

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## SPECIALIST STUDY RESULTS

- **Impacts on Wetlands**
  - The development of a nuclear power station at Duynefontein is unlikely to result in any unmitigable, highly significant negative impacts on wetlands
  - Development of the proposed nuclear power station at Bantamsklip would not be associated with any unmitigable impacts to wetland systems
  - The Thyspunt wetland systems are complex and potential negative impacts could occur without appropriate mitigation


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## SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Vertebrates**
  - The amount of land that is not of high faunal sensitivity at Duynefontein is more than sufficient for the nuclear power station
  - At Bantamsklip the nuclear power station could have significant negative potential impacts, without mitigation, because of the impacts on faunal habitats within the footprint
  - At Thyspunt a nuclear power station would have significant potential negative impacts, without mitigation, because of the direct impacts on faunal habitats within the footprint, the development of two major new access roads, and the need for a development corridor across a large mobile dune field


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### SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Invertebrates**
  - The potential impacts of the nuclear power station on the terrestrial invertebrate communities are very similar for all alternative sites, but there are site-specific differences
  - None of the butterflies occurring in the Cape Flats Dune Fynbos area around Duynefontein are endangered or endemic
  - Non-vegetated and partially vegetated portions of the site are of very low and low sensitivity, respectively.
  - The new species of ant found at Duynefontein is regarded as a generalist and is likely to be found on other areas of the site


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### SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Invertebrates**
  - Thyspunt has the highest butterfly diversity and conservation value of the alternative sites. Thyspunt is identified as higher sensitivity than Duynefontein, and only marginally lower than Bantamsklip
  - From the viewpoint of potential positive impacts of the nuclear power station, Duynefontein already positively benefits under the management of Eskom, which means that it would experience the least improvement in conservation status
  - Bantamsklip and Thyspunt would benefit substantially from formal protection status. The project would have a potential net positive impact on invertebrate communities at Bantamsklip or Thyspunt


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### SPECIALIST STUDY RESULTS

- **Economic Impacts**
  - The overall positive macro-economic impacts will be greatest at Bantamsklip and Duynefontein, and less at Thyspunt, as the sites are situated in a province with a larger, more diversified economy. Nuclear-1 would result in less dislocation of economic activities if located at Duynefontein than at either of the other two sites
  - Macroeconomic indicators favour Duynefontein and Bantamsklip
  - The cost-effectiveness analysis indicates that Thyspunt has a very slight edge over Duynefontein and a somewhat larger edge over Bantamsklip. The differences between the alternative sites are slight, and all the sites would have large positive economic impacts both on the local area and the province in which they are situated
  - The economic impact assessment gives greater weight to the cost-effectiveness analysis

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### SPECIALIST STUDY RESULTS

- **Heritage Impacts**
  - All alternative sites contain significant heritage resources.
  - The amount of Late Stone Age heritage that will be potentially impacted at Duynefontein will be substantially less than that of Bantamsklip and Thyspunt
  - Duynefontein is palaeontologically highly sensitive. Bantamsklip is almost as sensitive as Thyspunt in terms of its heritage richness

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## SPECIALIST STUDY RESULTS

### Marine Biology Impacts

- Potential impacts similar at all sites and the impacts can be mitigated if the proposed designs are implemented as planned
- Potentially the most significant impacts are:
  - Disruption of the marine environment through the offshore disposal of sediment
  - Release of warmed cooling water
- Potential impacts of marine spoil disposal will have a potentially highly significant long-term negative affect on the marine environment

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## SPECIALIST STUDY RESULTS

### Social Impacts

- Potential negative impacts relate to accommodation for temporary workers during construction
- Potential positive impact is the provision of electricity and related benefits to the broader national and regional economies
- Perceived risks associated with nuclear incidents could potentially lead to a change in attitude and behaviour – reliable information is important

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## SPECIALIST STUDY RESULTS

### Tourism Impacts

- Communities at Thyspunt and Bantamsklip have expressed opposition to the proposed power station
- Thyspunt community highlighted the premium nature of the top-end coastal vacation destination
- Bantamsklip community emphasised the new and fragile nature of the developing tourism product and the local dependence thereon
- Some Duynefontein tourism stakeholders have personal objections to another power station, however they recognise the potential for increased business and promote a generally positive outlook for tourism

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## SPECIALIST STUDY RESULTS

### Tourism Impacts

- Assessment takes account decline in nature-based tourism as well as an increase in business-related tourism associated with the proposed nuclear power station
- Duynefontein – limited potential impact during construction. During operation a potential 1.43% improvement in tourism is predicted
- Bantamsklip - potential 5% positive impact during construction. During operation a potential 8.57% improvement in tourism is predicted
- Thyspunt – Potential 7.86% negative impact during construction. During operation a zero potential impact is predicted

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## PROJECT ALTERNATIVES

- Forms of power generation
- Nuclear plant types
- **Layout of the nuclear plant**
- **Fresh water supply and utilisation of abstracted groundwater**
- Management of brine
- Intake of sea water
- **Outlet of water**
- Management of spoil material
- Access to Thyspunt
- **Waste**
- **The no-development alternative (i.e. 'No-Go')**
- **Location of the power station (i.e. site selection)**


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## SITE SELECTION

- Site selection was based on:
  - Results of independent specialist studies: the significance of potential impacts, with mitigation, at each of the sites
  - An integration workshop, involving all specialists, where ranking of the sites and key decision factors were agreed on
  - Quantified ranking taking into account the key decision factors


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## SITE SELECTION

- Impacts of low significance at all alternative sites filtered out e.g. noise, visual impacts, hydrology
- Impacts of medium and high significance that have the same significance at all sites were filtered out e.g. social
- The key factors for decision-making:
  - Integration into the national grid
  - Seismic suitability
  - Impacts on dune geomorphology
  - Impacts on wetlands
  - Impacts on vertebrate fauna
  - Impacts on invertebrate fauna
  - Economic impacts

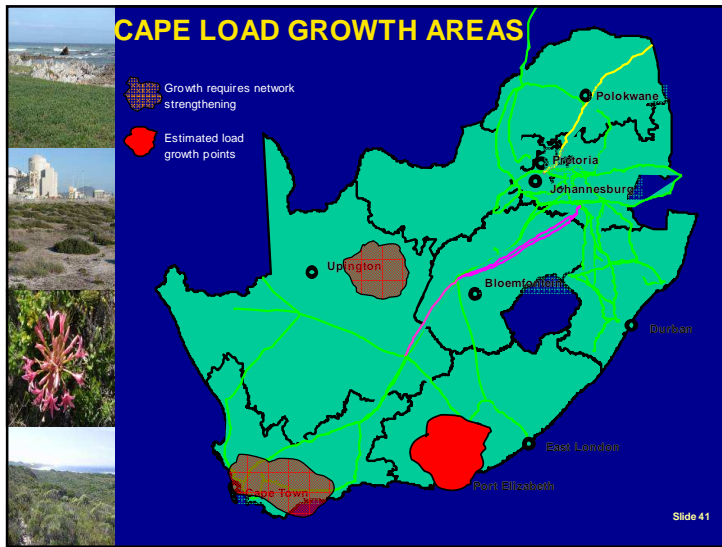
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## INTEGRATION INTO THE NATIONAL GRID

- Where do we require power stations for future load growth?
- Electricity needs to be transmitted from the high voltage yard at the power station through a network of transmission and distribution lines to end users
- To improve efficiency, Eskom tries to connect new base load generation to the closest load, where possible

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## SITE SELECTION

A number of factors indicate that Bantamsklip cannot be regarded as a preferred alternative when compared with the other two alternative sites:

- Substantially higher construction costs due to its remote location (requirements for upgrading of roads and bridges and lengthy transmission lines)
- Cumulative environmental impacts of the transmission corridors
- Potential impacts on invertebrate fauna

Bantamsklip is regarded as the least preferred site alternative for **Nuclear-1**

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## SITE SELECTION: RECOMMENDATIONS

A quantitative assessment of key criteria indicates that Thyspunt is preferred (with a score of 76 as opposed to Duynefontein's score of 57) due to:

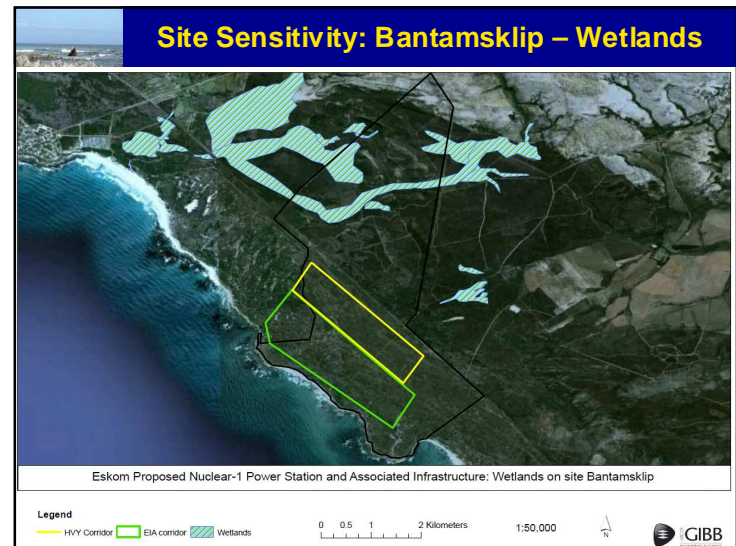
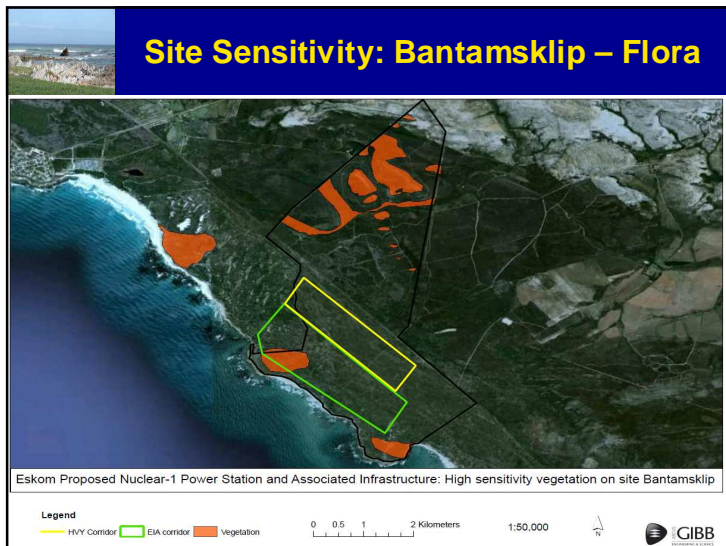
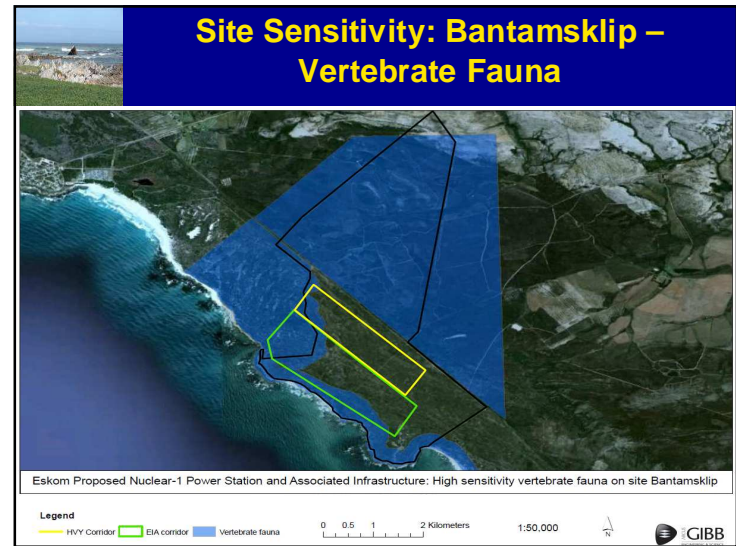
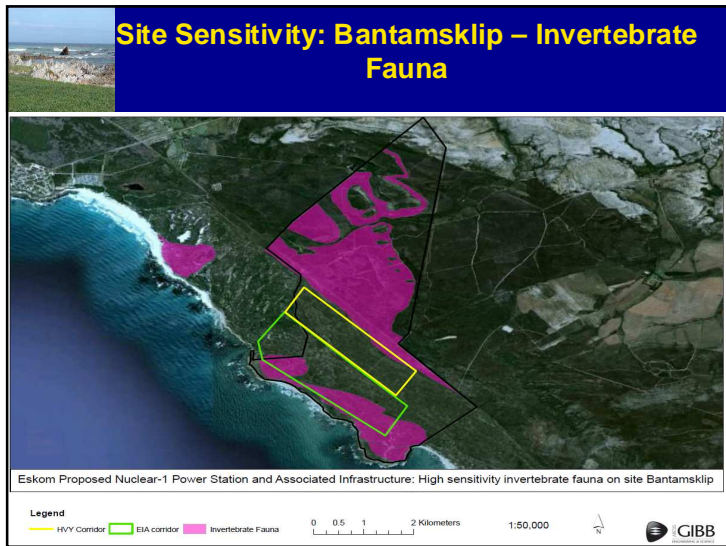
- Lower seismic risk
- Relative ease of integration into the transmission grid
- Site's locality relative to the Port Elizabeth load centre
- Potential overall positive conservation benefits of the majority of the site, as well as additional land being managed for conservation purposes
- Conservation benefits would not be realised at Duynefontein

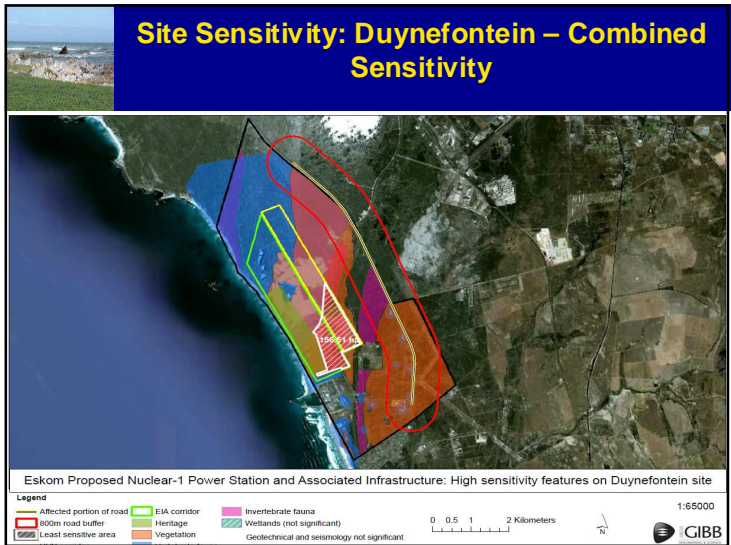
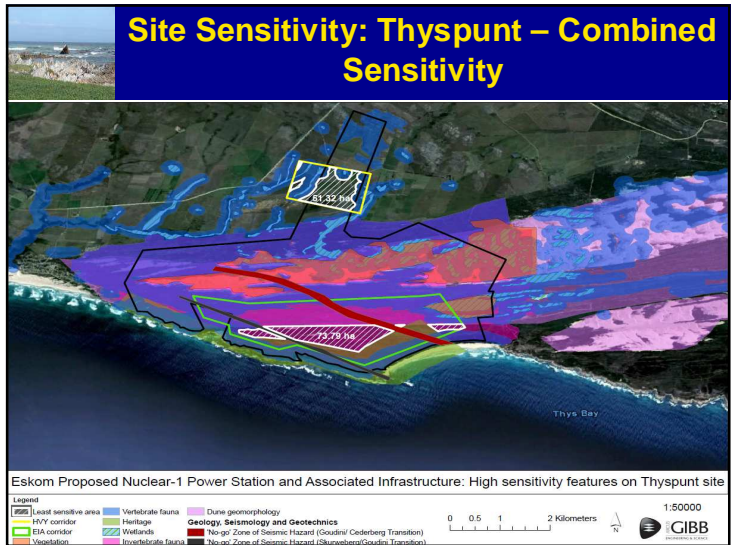
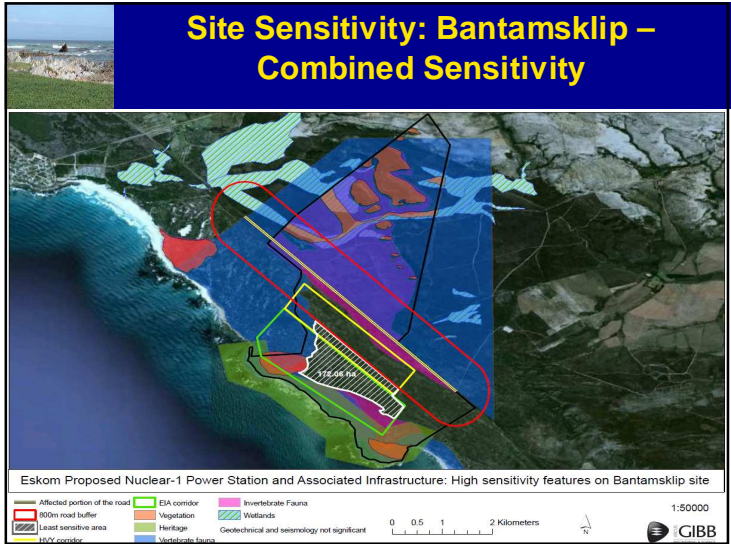
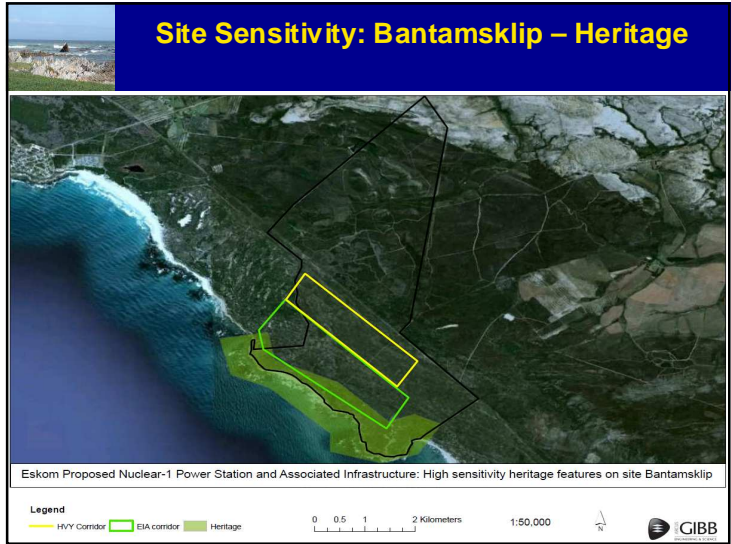
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## NUCLEAR PLANT LAYOUT

- Sensitivity maps of all specialist studies were integrated and composite maps were produced to indicate areas of high environmental suitability for each alternative site
- Finalisation of the site layout plans will require detailed investigations, in conjunction with relevant qualified and experienced specialists

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## FRESH WATER SUPPLY AND UTILISATION OF ABSTRACTED GROUNDWATER

- At all sites desalination provides a guaranteed source of fresh water supply for the lifespan of the proposed nuclear power station without jeopardising the availability of fresh water to other users
- A desalination plant is therefore the preferred alternative for the provision of fresh water at all sites

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## INTAKE AND OUTLET OF WATER

- The installation of intake and outlet tunnels that obtain water from the ocean and feed cooling water into a storage area located adjacent to the cooling water pump houses is the only feasible alternative for all sites
- Outlet structures for cooling water and chemical effluent must be offshore
- All releases need to occur at the distances prescribed by the relevant specialists
- Provided that the specific mitigation measures identified in the marine biology report are adhered to, offshore effluent release is the recommended alternative

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## WASTE

- The only feasible alternative for the disposal of Low-Level and Intermediate-Level radioactive waste is disposal at the Vaalputs nuclear waste disposal site
- Vaalputs is the only authorised facility for this form of waste in SA. Vaalputs has sufficient capacity for the waste that will be generated by Nuclear-1
- With regards to High-Level Waste (spent fuel), the only alternative currently available in SA is long-term storage of the spent fuel in the nuclear power station
- Vaalputs may be considered as a disposal site for High-Level Waste in future

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## NO-DEVELOPMENT ALTERNATIVE

- Given the urgent power demand in South Africa, the No-Go alternative is not considered to be an alternative, as Eskom's mandate is to provide power for the country
- Eskom would likely apply to develop coal-fired power stations if the current application is declined as coal-fired generation is the only feasible base load alternative
- The life-cycle environmental impacts of coal-fired power generation are much greater than nuclear-fuelled power generation

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## NO-DEVELOPMENT ALTERNATIVE

- If Eskom does not utilise Bantamsklip and Thyspunt for nuclear development, it is likely to sell the properties
- The sale of the properties will be to a willing buyer at the market-related price, which may result in an alternative form of land use that may not involve management of the majority of the properties as nature reserves

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## KEY MITIGATION MEASURES

- Independent specialists have proposed mitigation measures to reduce potential negative impacts
- Draft EMP has been compiled as part of draft EIR and if authorised, it will be a legally binding document
- Compliance to EMP must be independently audited throughout construction and operation
- Mitigation measures for botanical impacts, vertebrate and invertebrate fauna, wetlands and heritage resources are particularly important
- Mitigation of heritage impacts will require the work of a site-specific team dedicated to excavations over a period of several years prior to construction

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## KEY MITIGATION MEASURES

- Qualified and experienced botanical, wetland, vertebrate and invertebrate fauna, dune geomorphology and heritage specialists will need to find an acceptable final access route alignment
- Additional groundwater studies are necessary to better understand the interaction between groundwater and wetlands

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## WAY FORWARD

- Comment Period – 6 March to 10 May (66 days)
- Public meetings and key stakeholder workshops will be held around the sites assessed from 23 March to 21 April. Minutes of meetings will be sent to attendees
- Comments received will be addressed in the Issues and Response Report in the Final EIR
- Final EIR will be submitted to the DEA for consideration and decision-making
- Final decision regarding EIA will be communicated to registered I&APs
- Construction of Nuclear-1 is subject to other approvals e.g. the NNR site safety decision and transmission lines EIA authorisations

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## WAY FORWARD

Written comments can be submitted by:

- Post: Public Participation Office, Nuclear 1 EIA, PO Box 503, Mtunzini, 3867, SA
- Fax: +27 (0) 35 340 2232
- Email: nuclear1@acerafrica.co.za

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## MEETING CONDUCT

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- Show respect
- Focus on the issue not the person
- Be constructive
- Agree to disagree


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## THANK YOU

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## SPECIALIST STUDY RESULTS

### Oceanographic Impacts

- Nuclear-1 will be built at least 10 m above high water mark
- Dispersion of the plume is considered to be acceptable at all alternative sites
- Relatively unfavourable dispersion of the thermal plume takes place at Thyspunt, where the plume hugs the coastline and shallow near shore areas
- The most efficient dispersal of the thermal plume will occur at Duynefontein
- Potential for suspended sediment plumes to impact upon tourism (e.g. shark cage diving at Dyer Island) should be mitigated

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**SPECIALIST STUDY RESULTS**

**Impact on Transportation Systems**

- Duynfontein does not require significant upgrades to transport systems during construction and operation
- Costly upgrades are required to the public transport system for Bantamsklip and Thyspunt. Upgrades would be significant for Bantamsklip

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**SPECIALIST STUDY RESULTS**

**Impact on Fresh Water Supply**

- There are no rivers or perennial streams at any of the alternative sites and construction and operation of the power station will thus not have any direct impacts on surface water supply schemes or catchments
- As groundwater is near the end of the flow path, the only existing groundwater use that could be directly affected are the coastal springs and potential impacts would be of a localised extent

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**SPECIALIST STUDY RESULTS**

**Impact on Hydrological Conditions**

- Direct hydrological impacts at all alternative sites are of a low significance
- Potential impacts relate to flood hazard at low points along the coastal frontage of the EIA corridor and increased surface run-off volumes and peaks

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**SPECIALIST STUDY RESULTS**

**Impact on Geotechnical Suitability**

- Potential impacts related to slope stability imposing safety risks are of a low significance and consequences at all sites, as slope stability design techniques will be employed to deal with these issues
- Potential impacts associated with larger volume excavations in sands will be significant at all sites, depending on the final footprint, and will need mitigation

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**SPECIALIST STUDY RESULTS**

**Impacts on Geological Risk**

- There is a low geological risk and no disqualifiers at any of the sites and surrounding environment
- Potential impacts related to geological risk is interrelated to the seismic hazard of the site and water quality in the area

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**SPECIALIST STUDY RESULTS**

**Agriculture Impacts**

- Agriculture around Thyspunt is based mainly on milk production (2008: R150 m per annum) -
- Fynbos farming prevails at the Bantamsklip although there is some dairy as well as grape, beef, sheep and game farming (2008: R29 m per annum)
- Duynfontein is based on mixed farming (2008: R75 m per annum)

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**SPECIALIST STUDY RESULTS**

**Agriculture Impacts**

- Duynfontein – no impact on agriculture during construction and operation
- Bantamsklip – negative potential impact of dust (construction). Potential of less than 5% increase in local market due to water limitations that restrict expansion
- Thyspunt – negative potential impact of dust (construction). Potential for positive impact on production by increasing the size of the local market for fresh produce

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**SPECIALIST STUDY RESULTS**

**Air Quality Impacts**

- Sources of impacts during construction would be fugitive dust emissions from general construction activities and emissions from vehicles and equipment
- Potential sources of non-radioactive air emissions during operation:
  - Carbon, sulfur and nitrogen oxides in the exhaust gases from engines of the backup electricity generators
  - Formaldehyde and carbon monoxide emitted by the insulation when installations go back into operation after servicing
  - Ammonia discharged as the temperature rises in the steam generators during start-up

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## SPECIALIST STUDY RESULTS

### Air Quality Impacts

- Low predicted impacts of non-radiological pollutants when compared to human health risk and vegetation impact criteria
- During normal operation, trace quantities of radiological materials will be released to the environment
- Dispersion simulations included a number of identified Design Basis Accidents. Predicted highest whole body dose at 1 km downwind of power station following such accidental releases was shown to be below the maximum acceptable limit of 50 mSv for a single event, as stipulated by the NNR

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## SPECIALIST STUDY RESULTS

### Noise Impacts

- Potential negative noise impacts are of low or very low significance
- There will be no potential noise impact on adjacent land surrounding any of the sites during construction and operation due to large distances between power station and site boundary
- OCGT power plant (emergency power) will be placed on property boundary at Thyspunt, which will result in a potential noise impact on residents situated within 1000 m of the plant

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## SPECIALIST STUDY RESULTS

### Visual Impact

- Due to the size of a nuclear power station and its location in relative open, treeless landscapes along the coast, with negligible visual screening by landforms, potential visual impacts at all sites may be significant
- The use of screens, appropriate lighting, appropriate positioning of spoil dumps and attention to the colour of large structures etc. is recommended

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## SPECIALIST STUDY RESULTS

### Impacts of Emergency Planning

- Duynefontein is currently in proximity to the Koeberg Nuclear Power Station, therefore the emergency response infrastructure and systems are in place
- Outcomes of the Safety Analyses will determine if the current infrastructure would be adequate to cope with the demands of the proposed power station
- Bantamsklip and Thyspunt will require substantial upgrading of infrastructure since they are in remote areas

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## SPECIALIST STUDY RESULTS

### Site Control Impacts


#### Duynfontein

- Site already developed as a NPS with full access and site control
- It has full visitor facilities with a Visitor's Centre
- Access will be via new access control points and upgraded existing roads leading off the R27

#### Thyspunt

- Access to the site is currently limited and controlled by fencing and electronic/locked gates
- A new access control point will be developed on the western or eastern owner controlled boundary and at the outer and inner security fence

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## SPECIALIST STUDY RESULTS

### Site Control Impacts

- Bantamsklip
  - Access to the site is currently limited and controlled by fencing and gates
  - The R43 tarred road passes through the site

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## SPECIALIST STUDY RESULTS

### Human Health Impacts

- The NNR will issue a license for the establishment of an NNR at any particular site only if full compliance with the radiological dose limits and dose constraints is demonstrated, taking into account the principles of ALARA and all other matters relating to the overall safety case

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## SPECIALIST STUDY RESULTS

### Geohydrological Impacts

Six potential environmental impacts involving groundwater have been identified:

- Flooding by groundwater
- Depletion of local aquifers
- Degradation of ecologically sensitive wetlands / phreatophytes/ seeps /springs
- Contamination
- Degradation of infrastructure
- Contamination of the shore zone

• The impacts are of low significance due to the sites being situated in coastal zones with groundwater being at/near the end of its flow path and minimal downstream receptors

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## SPECIALIST STUDY RESULTS

### 1:100 Flood Line

The 1:100 year flood lines have been calculated for each site for the present day and 2075 (based on predicted sea level rise).

Site	Present day: Excluding climate change		Year 2075: Including climate change	
	Min [m MSL]	Max [m MSL]	Min [m MSL]	Max [m MSL]
Thyspunt	4.4	9.9	5.7	11.2
Bantamsklip	4.0	9.4	4.8	10.8
Duynfontein	4.4	6.3	5.3	7.4