

## 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


Slide 1



## 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: 19:00 – 19:50
5. Way forward and close: 19:50 – 20:00

Slide 2




## 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!**


Slide 3



## 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


Slide 4



## 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


Slide 5



## 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


Slide 6



## 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


Slide 7



## 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


Slide 8



## 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 and Duynefontein – Scoping Report accepted by Authorities and EIA phase has commenced


Slide 9



## 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. Separate EIA required for any further expansion beyond 4 000 MW
- 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 (e.g. access roads, OCGT plant, HV yard, visitor centre)


Slide 10



## PROJECT BACKGROUND

- 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 (optimistic)
- Construction period – 7 to 9 years
- Labour requirements:
  - Construction – 7 700 persons
  - Operation – 1 400 persons
- Construction and operational access routes to site - 22 m wide, tarred
- Normal (sedans), heavy (buses, trucks) and exceptionally heavy vehicles (42 m x 8.23 m max.)
- Peak construction vehicle trips: 828 morning and 945 evening

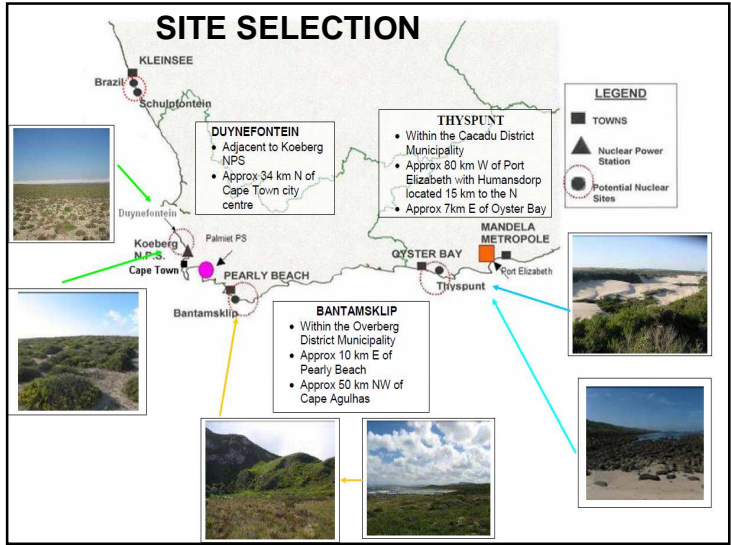
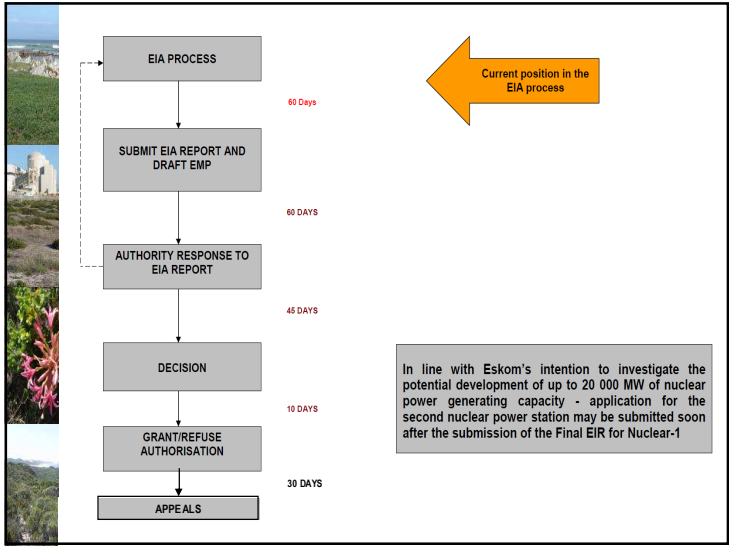
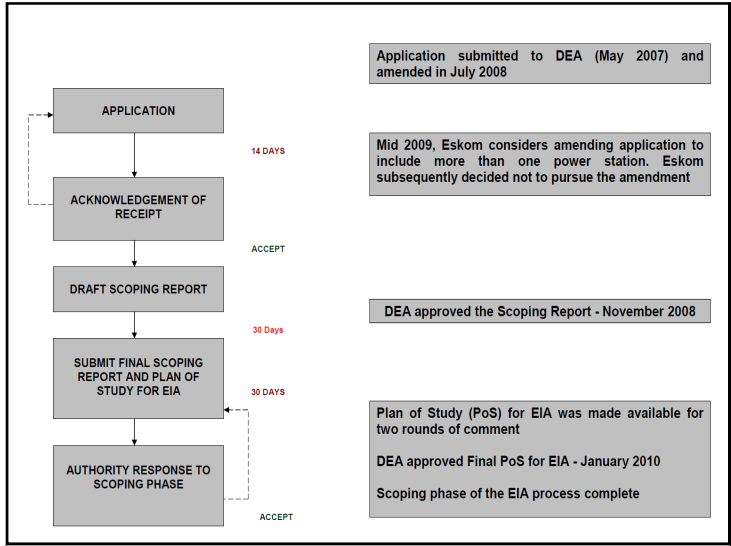
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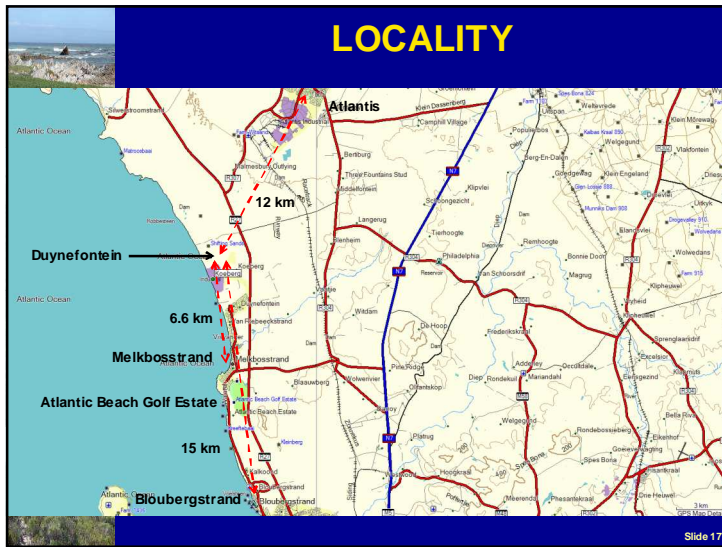


## ENVELOPE OF CRITERIA

- 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 Generation III PWR technology

Slide 12





## 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

Slide 18

## 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

Slide 19

## 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 (wetlands)**
  - Oceanographic conditions
  - Marine biology**
  - Air quality
  - Assessment of the 1:100 year floodline


Slide 20



## SPECIALIST STUDIES

- **Socio-economic Impacts**
  - Social impacts**
  - Economic impacts**
  - Noise
  - Visual
  - Heritage and cultural resources**
  - Waste
  - Tourism impacts**
  - Agriculture**
  - Transport
- 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)

Slide 21




## 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:

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


Slide 22



## SPECIALIST STUDY RESULTS

- **Impacts on Dune Geomorphology and associated geo-hydrology (landforms, sand and water movement)**
  - Groundwater does not 'daylight' at **Duynefontein** and **Bantamsklip** sites: access roads and transmission lines can be built across the mobile dunes
  - The interaction between dune systems and wetlands is complex at **Thyspunt**, since groundwater 'daylights' in many inter-dune areas
  - Haul roads and conveyor belts through Oyster Bay dunefield at **Thyspunt** between the nuclear power station and the HV yard, may cause more significant dune geomorphology impacts than at the other two sites


Slide 23



## SPECIALIST STUDY RESULTS

- **Impacts on Flora (plants)**
  - **Bantamsklip** will experience the least potential negative impact on plant communities and species - the ecosystems on this site are fairly common along this section of coastline
  - **Thyspunt** has the greatest diversity of vegetation communities, including extensive and highly sensitive wetlands


Slide 24



### SPECIALIST STUDY RESULTS

- **Impacts on Wetlands**
  - Development of a nuclear power station at **Duynfontein** 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
  - **Thyspunt** wetland systems are complex and potential negative impacts could occur without appropriate mitigation


Slide 25



### SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Vertebrates (mammals and birds)**
  - Amount of land that is not of high faunal sensitivity at **Duynfontein** 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 potential impacts on faunal habitats within the footprint, the development of two access roads and proposed infrastructure across the dunefield


Slide 26



### SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Invertebrates (insects)**
  - Potential impacts on terrestrial invertebrate communities are similar for all alternative sites, with site-specific differences
  - **Duynfontein:**
    - None of the butterflies are endangered or endemic
    - Low to very low overall insect sensitivity
    - New species of ant found is regarded as a generalist (likely to be found on other areas of the site)


Slide 27



### SPECIALIST STUDY RESULTS

- **Impacts on Terrestrial Invertebrates**
  - **Thyspunt** has the highest butterfly diversity and conservation value of the alternative sites
  - From the viewpoint of potential positive impacts of the nuclear power station, **Duynfontein** 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, resulting in a net positive impact on insect communities


Slide 28



### SPECIALIST STUDY RESULTS

- **Economic Impacts**
  - Positive macro-economic impacts will be greatest at **Bantamsklip** and **Duynfontein** 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 Duynfontein than at either of the other two sites
  - Macroeconomic indicators favour **Duynfontein** and **Bantamsklip**
  - Cost-effectiveness analysis indicates that **Thyspunt** is slightly favoured relative to **Duynfontein** and more favoured relative to **Bantamsklip**.
  - The differences between the alternative sites are slight, and all the sites would have 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, which favours **Thyspunt**


Slide 29



### SPECIALIST STUDY RESULTS

- **Heritage Impacts (archaeological sites, fossils and built environment)**
  - All alternative sites contain significant heritage resources
  - **Duynfontein** is palaeontologically highly sensitive, but has less Stone Age heritage than **Bantamsklip** or **Thyspunt**
  - **Thyspunt** more sensitive than **Bantamsklip** in terms of its heritage richness – sites mostly along coast at all sites. 200 m setback line recommended to protect heritage sites

Slide 30




### 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
- Spoil disposal will have a potentially highly significant long-term negative impact on the marine environment within a localised area (4.5km<sup>2</sup> at Duynfontein) – acceptable impact according to marine specialist

Slide 31




### SPECIALIST STUDY RESULTS

#### Marine Biology Impacts

- Impacts on Chokka fishing industry at Thyspunt
- Impact on Abalone at Bantamsklip
  - With respect to release of:
    - Spoil
    - Warm water

Slide 32






## SPECIALIST STUDY RESULTS

### Marine Biology Impacts

- Radionuclides such as Cesium (Cs-137) and Strontium (Sr-90) present in oceans alongside other elements since 1940s
- Background Cesium has been recorded at Koeberg before the power station was established - detected in mussels, sand mussels and fish below levels at which further investigation would be required
- Strontium not recorded in marine organisms at Koeberg
- Due to few organisms in which Cesium has been recorded, low concentrations and lack of Strontium, these nuclides have no detectable potential impact on marine organisms

Slide 33




## 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

Slide 34




## 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 **Duynfontein** 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

Slide 35




## 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
- **Duynfontein** – limited potential impact during construction; potential 1.4% improvement during operation
- **Bantamsklip** - potential 5% positive impact during construction; a potential 8.6% improvement during operation
- **Thyspunt** – potential 7.9% negative impact during construction; 0% impact during operation

Slide 36




## SPECIALIST STUDY RESULTS

### Agricultural 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)

Slide 37



## SPECIALIST STUDY RESULTS

### Agricultural 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 15% positive impact on production due to increased local market


Slide 38



## PROJECT ALTERNATIVES

- **Location of the power station (i.e. site selection)**
  - 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**
- **No-development (i.e. 'No-Go')**

Slide 39




## SITE SELECTION

- Site selection was based on:
  - Results of independent specialist studies: the significance of potential impacts, with mitigation, at each of the alternative 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

Slide 40

## 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



Slide 41

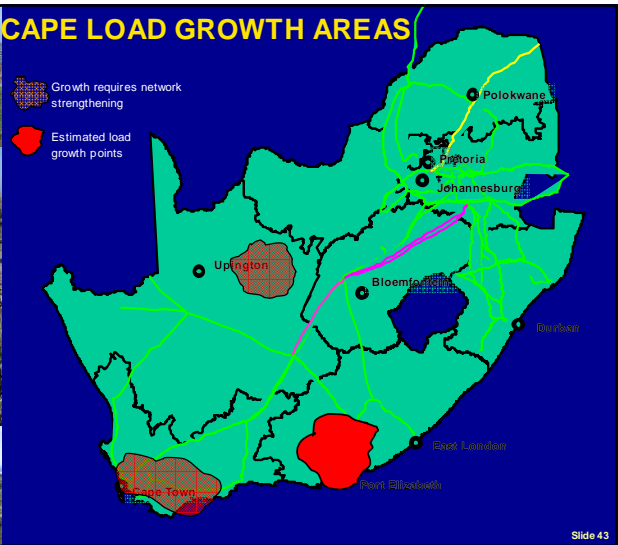
## INTEGRATION INTO THE NATIONAL GRID



- 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 connect new base load generation to the closest load, where possible



Slide 42

## CAPE LOAD GROWTH AREAS



 Growth requires network strengthening  
 Estimated load growth points


Slide 43

## SITE SELECTION

A number of factors indicate that **Bantamsklip** cannot be regarded as a **preferred alternative** for Nuclear-1 when compared to 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**



Slide 44




## SITE SELECTION: RECOMMENDATIONS

A quantitative assessment of key criteria indicates that **Thyspunt** is preferred (with a score of 76 as opposed to **Duynfontein'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 benefits of the conserving the majority of the site (2 400ha), as well as additional land being managed for conservation purposes
- Conservation benefits would not be realised at Duynfontein

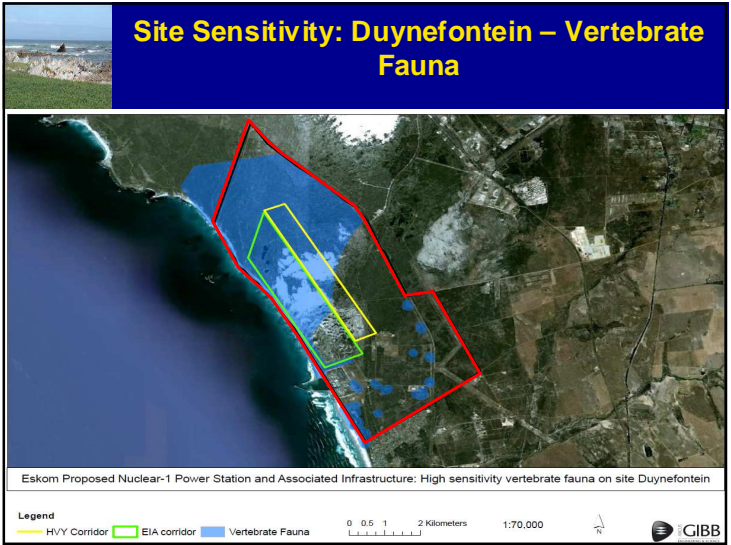
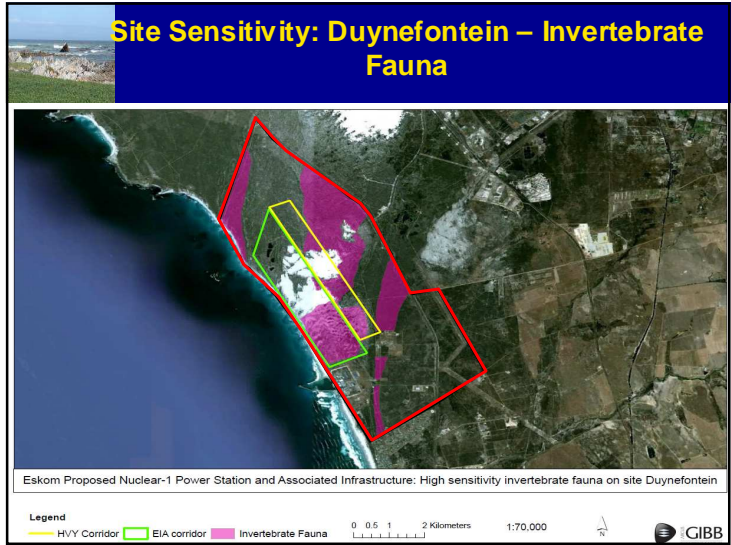
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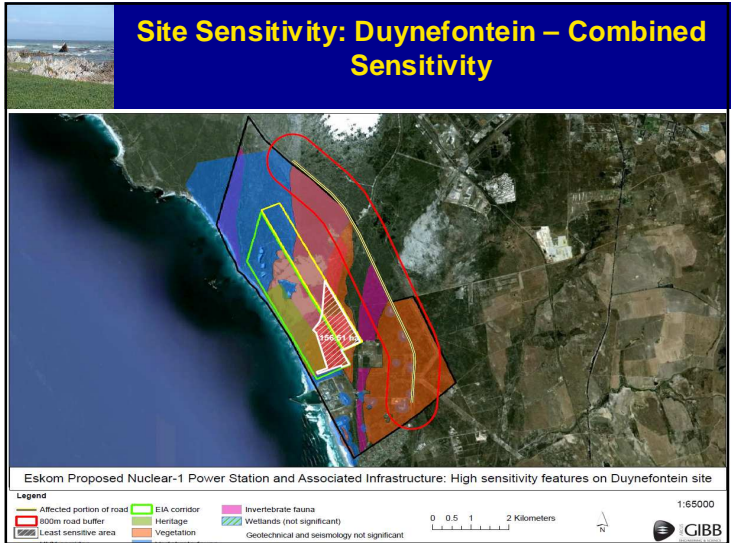
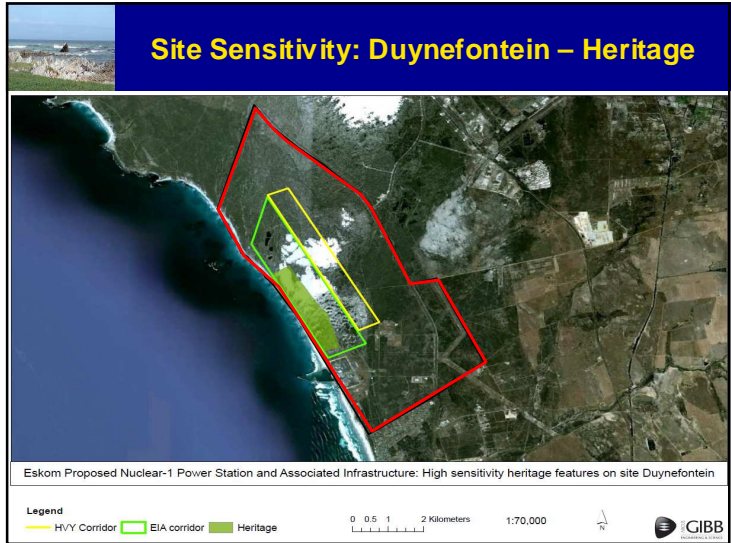
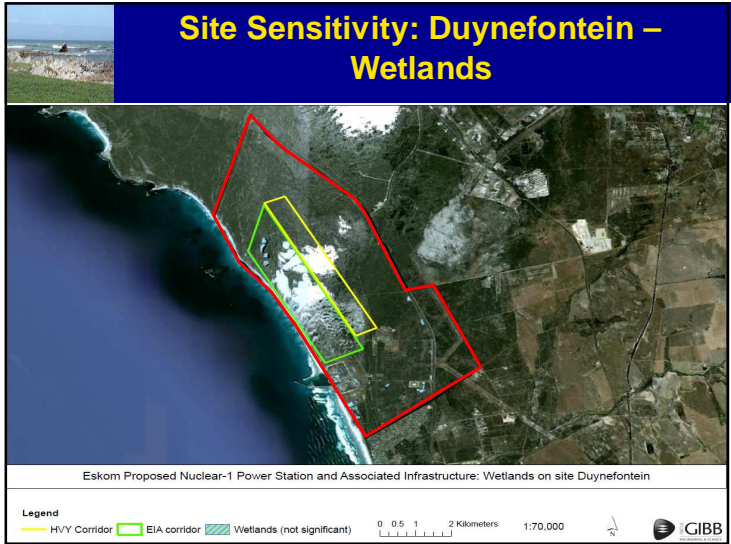
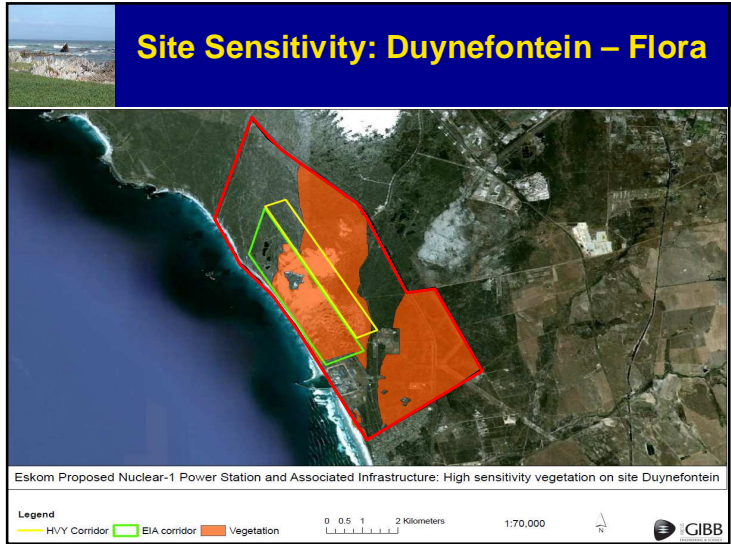


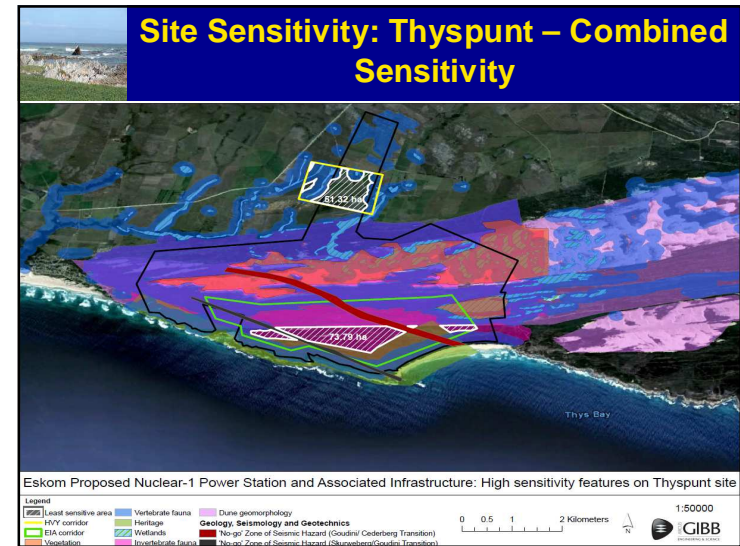
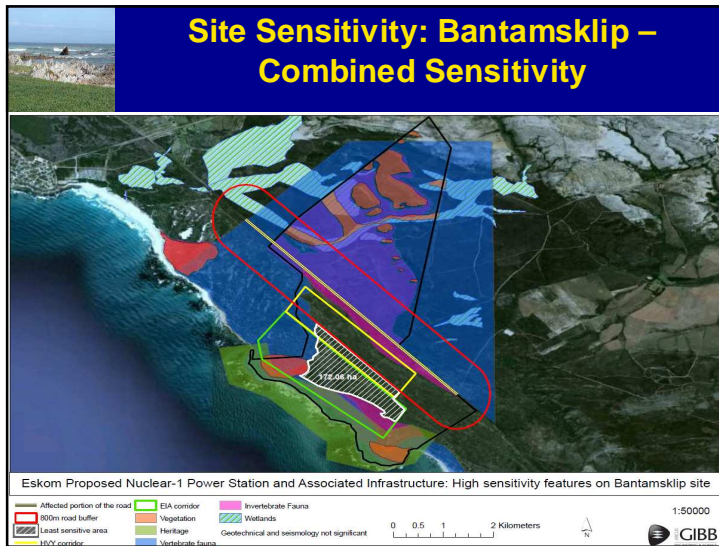
## NUCLEAR PLANT LAYOUT

- 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

Slide 46







### CONSERVATION BENEFITS

- In spite of potentially significant negative impacts, all biophysical specialists in agreement:
  - no fatal flaws at any of the sites
  - positive impacts for conservation of the area outside the footprint of the power station at **Thyspunt** and **Bantamsklip** are significant
- Acquisition of properties for conservation outside the current **Thyspunt** property for wetland conservation
- To guarantee conservation benefits, Thyspunt and Bantamsklip's conservation status must be secured, i.e. declared as official nature reserves

Slide 55

### 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
- Desalination plant is therefore the preferred alternative for the provision of fresh water at all sites, from the construction phase

Slide 56



## INTAKE AND OUTLET OF WATER

- 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 and depths prescribed by the relevant specialists
- Provided that the specific mitigation measures identified in the marine biology report are adhered to, offshore effluent release above the sea floor is the recommended alternative

Slide 57



## MANAGEMENT OF SPOIL MATERIAL

- Fine spoil must be disposed of in the marine environment at all sites
- Spoil material that cannot be pumped to sea, must be disposed of on land and used for activities like levelling of the HV yard and to minimise the footprint on the terrestrial environment
- Visual impact of spoil dumps must be minimised
- Transport of spoil to the panhandle at Thyspunt via conveyor belt is not recommended due to the Oyster Bay mobile dune system

Slide 58



## WASTE TYPES

- Low-level waste:  $\pm$  940 drums (50 – 100 kg per drum) per year
- Intermediate level waste:  $\pm$  160 x 6.3 ton concrete drums per year
- High level waste:  $\pm$  1 880 tons of spent fuel over life of power station (60 years)

Slide 59



## WASTE DISPOSAL

- Only feasible alternative for the disposal of Low-Level and Intermediate-Level radioactive waste is Vaalputs nuclear waste disposal site in Northern Cape
- This 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, only alternative currently available in SA is long-term storage of the spent fuel in the power station – common practice internationally
- Vaalputs may be considered as a disposal site for High-Level Waste in future


Slide 60



## WASTE DISPOSAL

- National Radioactive Waste Management Institute established by the National Radioactive Waste Management Institute Act No. 53 of 2008)
- Act came into effect in Dec 2009
- Subject to NNR Regulations
- Institute will transfer responsibility from NECSA

Slide 61



## 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
- Life-cycle environmental impacts of coal-fired power generation are greater than nuclear-fuelled power generation


Slide 62



## NO-DEVELOPMENT ALTERNATIVE

- If Eskom does not utilise Bantamsklip and Thyspunt for Nuclear-1, there are two options:
  - Keep as a future nuclear site; or
  - Sell to a willing buyer - this may result in an any alternative form of land use - may not involve management of the majority of the properties as a nature reserve

Slide 63



## 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

Slide 64





## KEY MITIGATION MEASURES

- Qualified and experienced botanical, wetland, vertebrate and invertebrate fauna, dune geomorphology and heritage specialists will need to find acceptable detailed final access route alignments
- Additional groundwater studies are necessary to improve accuracy to of the groundwater model to understand interaction between groundwater and coastal seep wetlands
- Cut-off wall to prevent drawdown of groundwater affecting wetlands during construction
- Acquisition of properties on eastern side of site outside of current Eskom property up to the western boundary of The Links for dedicated wetland conservation

Slide 65



## WAY FORWARD

- Comment Period – 6 March to 10 May (66 days) – extension to 31 May (87 days)
- Websites: [www.gibb.co.za](http://www.gibb.co.za) and [www.eskom.co.za/eia](http://www.eskom.co.za/eia)
- 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

Slide 66



## WAY FORWARD

- 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

Slide 67



## 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](mailto:nuclear1@acerafrica.co.za)

Slide 68



## MEETING CONDUCT

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Slide 69



## THANK YOU

Slide 70

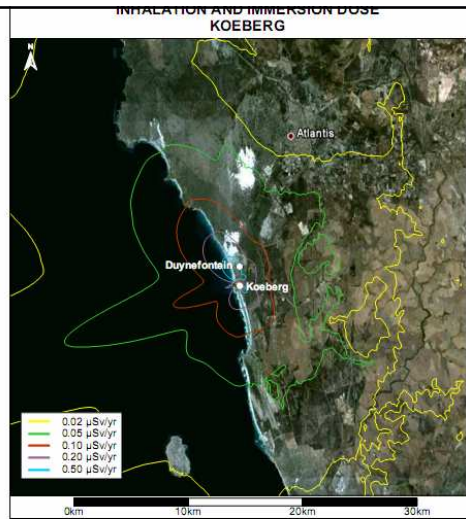


Figure 2-40: Predicted maximum annual inhalation and immersion radiation dose in μSv for Koeberg

Slide 71



## Radioactive emissions

“Govt. Notice No. R 388 of 2009 specifies that the annual effective dose limit for members of the public ... is 1 000 μSV, with an additional provision for an annual dose constraint of 250 μSV. The highest predicted inhalation and external effective dose of 11.3 μSV is therefore about 4.5% of the dose constraint and about 1% of the annual effective dose limit.”

Slide 72