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### environmental affairs

Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA

# Using GIS for Environmentally Sustainable planning in South Africa

Fahiema Daniels, Tsamaelo Malebu, Lydia Cape, Marshall Mabin, Annick Walsdorff, Rohaida Abed f.daniels@sanbi.org.za



# **SA's National Development Plan**

18 SIPs - unlock strategic development potential from project-level, municipal infrastructure to national scale projects - PICC

- SIP 8 Green Energy in support of the South African economy
  - SIP 9 Electricity Generation
- SIP 10 Electricity Transmission and Distribution for all



#### **Operation Phakisa**

- Government initiative (2014) to fast track the implementation of solutions on critical development issues
- 3 Labs Ocean Economy Lab
- 4 Critical Areas ----> Offshore Oil and Gas
- 11 Initiatives ----> A1 Development of a Phased Gas Pipeline Network



From an Environmental legislative perspective DEA is responding to planning requirements through Strategic Environmental Assessments (SEAs)



Restore

- Land use planning
- EIAs -
- Mining guideline
- **Classification of** water resources

- Env public works
- Spatial info to inform broader NRM work
- Pilots to show value of ecol infrastructure



# Sensitivity Assessment

Level of Constraint	Description
Very High	The area is rated as extremely sensitive to the negative impact of electricity grid infrastructure development. As a result the area will either have very high conservation value, very high existing/ potential socio-economic value or hold legal protection status.
High	The area is rated as being of high sensitivity to the negative impact of electricity grid infrastructure development. As a result the area will either have high conservation value and or existing/potential socio-economic value.
Medium	The area is rated as being of medium sensitivity to the negative impact of electricity grid infrastructure development. As a result the area will either have medium levels of conservation value and/or medium levels of existing/potential socio-economic value.
Low	Area is considered to have low levels of sensitivity in the context of electricity grid infrastructure development.

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# **Electricity Grid Infrastructure**





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# Initial Corridors from Eskom



# Mapping Demand

**Final Generation Layer** 

#### **Final Generation Layer** Final Load Layer Legend 150 km corride Generation MW Score 1 (1-50 MW) 2 (51-100 MW) Legend 150 km comdo Load MW Score 3101-150 MW 4 (151-200 MW) 1 (1-50 MV 5 (201-250 MW) 6 (251-300 MW) 3 (101-150 MW 4 (151-200 MW 7 (301-350 MW) 5 (201-250 NW 8 (351-400 MW) 6 (251-300 MW 9 (401-450 MW) 10 (451-50 MW)) A (351-400 MW 11 (>500 MW) din a SANBI Professional SANBI Professional ( Eskom ( Eskom

Final Load Layer





# Mapping Future Energy Demand



# **Environmental Constraints Mapping**



# Corridor Refinement



# **Final Energy Corridors**



- Reduced requirements for enviro authorisation
- Environmental prescreening
- Ability to choose from a network of paths



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## Least Cost Path Analyses



### Least Cost Path Analyses



# Renewable Energy Development Zones (Wind and Solar PV)







South Mrican Wind Energy Associatio



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# **Positive Mapping**

#### Base data = wind resource / solar resource

#### Normalization Criteria (pull factors):

- Generator network losses: 1.
- 2. DTI proposed renewable energy related Special Economic Zones (SEZs);
- Industrial ports; 3.
- 4. Solar and Wind corridors:
- 5. Seat of local municipalities with high social need; and
- 6. Network capacity (as per GCCA substation).



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### **Positive Mapping:** Top Development Potential Per Province



# Negative mapping (Exclusion areas)





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# Study Areas



### 8 Focus Areas



Prescreened Env sensitivities

Focus areas connected to the new EGI



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# Phased Gas Pipeline Corridors

# **TRANSNE**









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# **Initial Proposed Routes**

Secunda

Phase 3

Start Phase 4

**Richards** Bay

#### Phasing

- Phase 1a: Saldanha to Ankerlig
- Phase 1b: Saldanha to Mossel Bay
- Phase 2: Mossel Bay to Coega
- Phase 3: Richards Bay to Secunda
- Phase 4: Mozambique Southern Border to Richards Bay
- Phase 5: Abrahamvilliersbaai to Ankerlig Take-off
- Phase 6: Phase 1 to Oranjemund (Namibia)
- Phase 7: Coega to Richards Bay
- Rompco: Komatiepoort to Secunda
- Shale Gas:

Beaufort West to Phase 2

Oranjemund

Phase 6

Abrahamvilliersbaai

Phase 5

Phase 1a

Phase 2 Coega

Mossel Bay

### Buffered and altered corridors



# Map of Potential Energy Demand



# **Potential Gas Markets**





## **Gas Corridor Refinements**



# Unlocking the Energy sector of SA



# Implications for the Energy Sector

- Alignment between different energy types
- Upfront identification of environmental sensitivities and associated risk
- Identified mitigation where appropriate
- Stream lined environmental authorisation process in Medium and Low sensitivity areas
- Sectors can improve business decisions based on least cost path analyses



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### **Questions and Discussion**







