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DEA National Electricity Grid Infrastructure SEA

The identification of suitable routing corridors for the efficient and effective expansion of Electricity Grid Infrastructure (EGI)

Expert Reference Group Meeting

11 June 2014

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Electrical Grid Infrastructure SEA Project Team

Project Coordinator: DEA

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Project Partner: Eskom

Ronald Marais Head of Strategic Transmission Planning	**Kevin Leask** Chief Transmission Engineer

Environmental Consultants: CSIR

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Joint Service Provider: South African National Biodiversity Institute

Jeffrey Manuel and Fahiema Daniels

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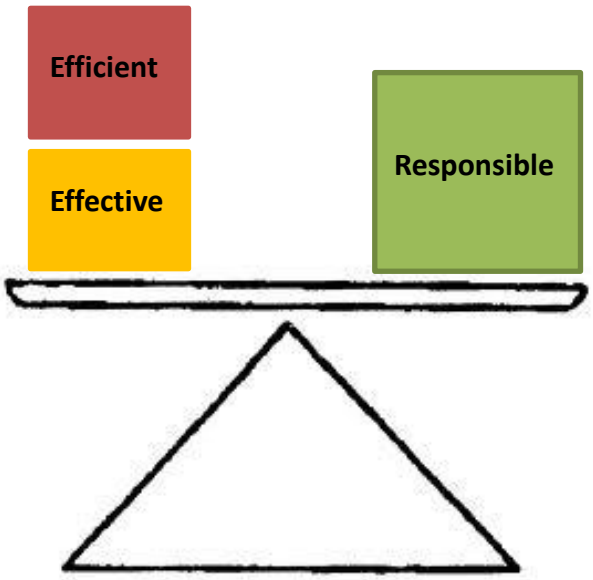
Vision and Objectives of SEA

Vision for the SEA: ***Strategic Electrical Grid Infrastructure (EGI) is expanded in an environmentally responsible and efficient manner that responds effectively to the country's economic and social development needs.***



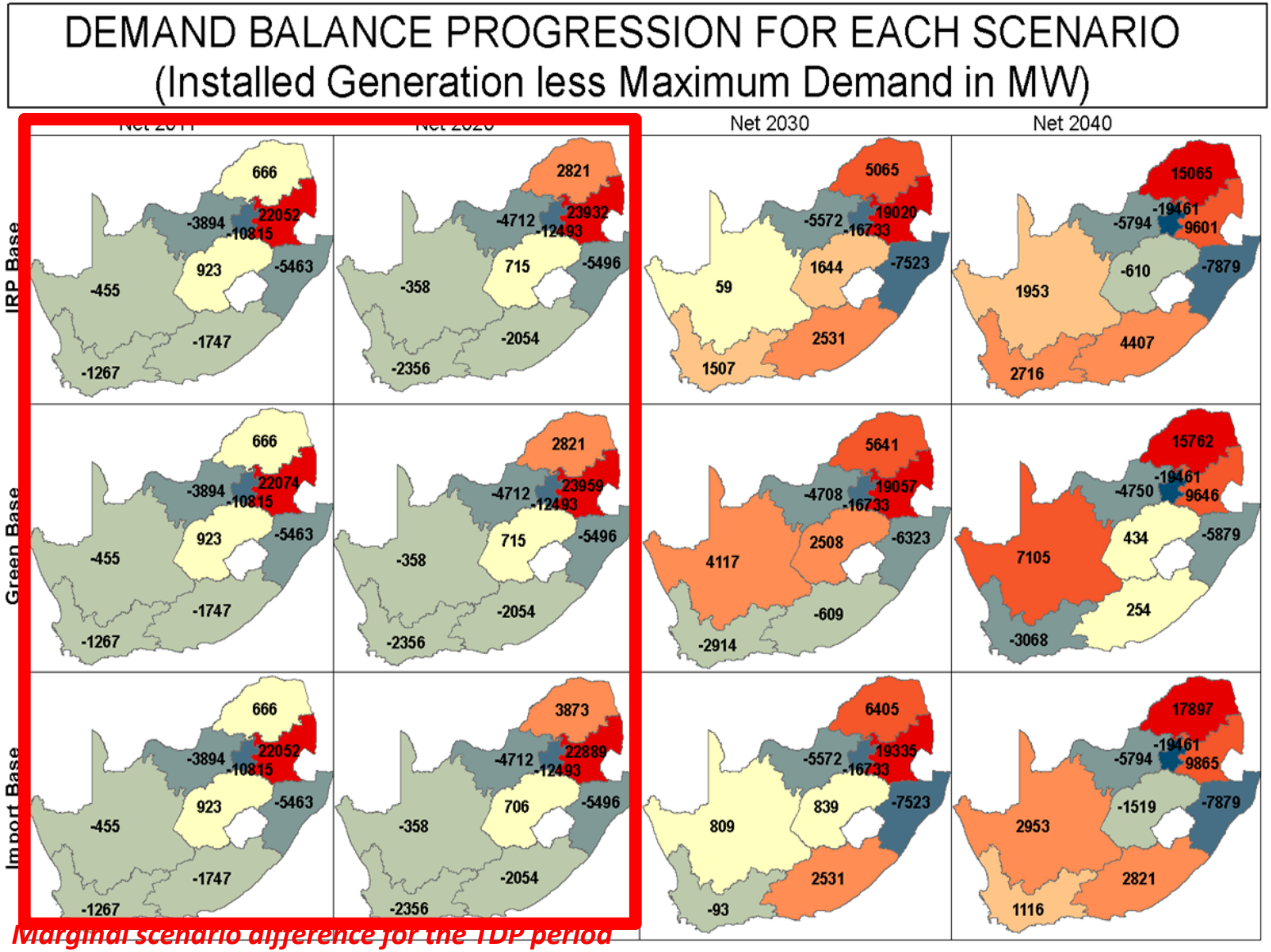
Objectives of the SEA:

- Identify strategic corridors for future Electrical Grid Infrastructure (EGI) expansion.
- Determine high level suitability from an environmental, economic and social perspective.
- Streamline the authorisation process for EGI within the corridors.
- Enable Eskom greater flexibility when undertaking land negotiation.
- Enable upfront strategic investment
- Promote collaborative governance between authorising authorities.
- Develop a site specific development protocol.

Identifying Strategic Corridors for EGI

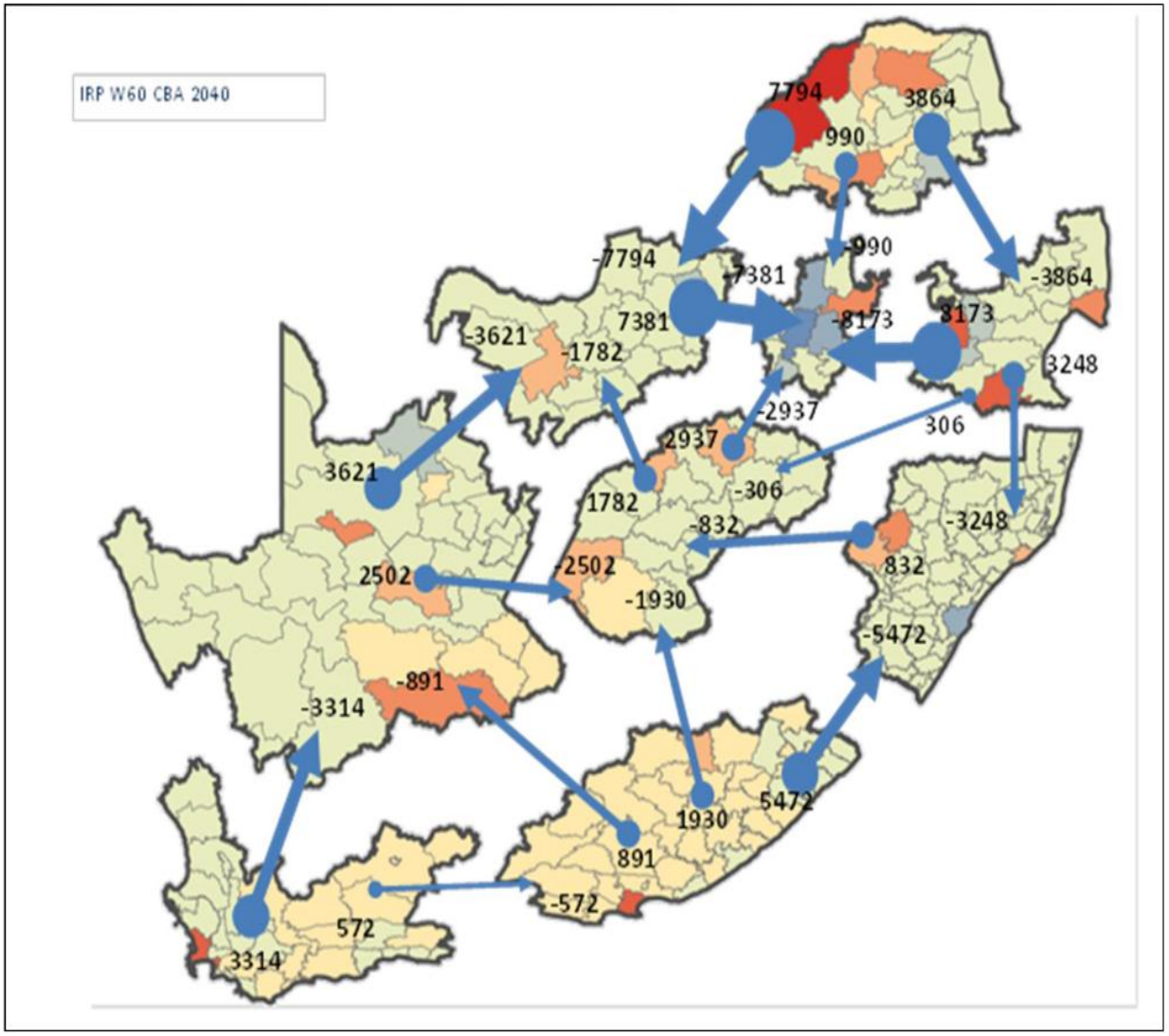
- Eskom Strategic Grid Plan Study: Formulates long term strategic transmission corridor requirements fro South Africa
- 20 year horizon, extended to 30 years for purposes of this study
- Based on range of generation scenarios, and associated strategic network analysis
- Three future scenarios considered:
  - **The IRP 2010 base Scenario**
    - Extended to 2040
  - **Increased Renewable Scenario**
    - Replace nuclear component with RE base generation equivalent
    - CSP (with storage)/ Wind with CCV of 30% / Natural Gas
  - **Increased Import Scenario**
    - Double imported power by 2030
    - Reduce coal & nuclear

Comparing Demand Balances for each Generation Scenario



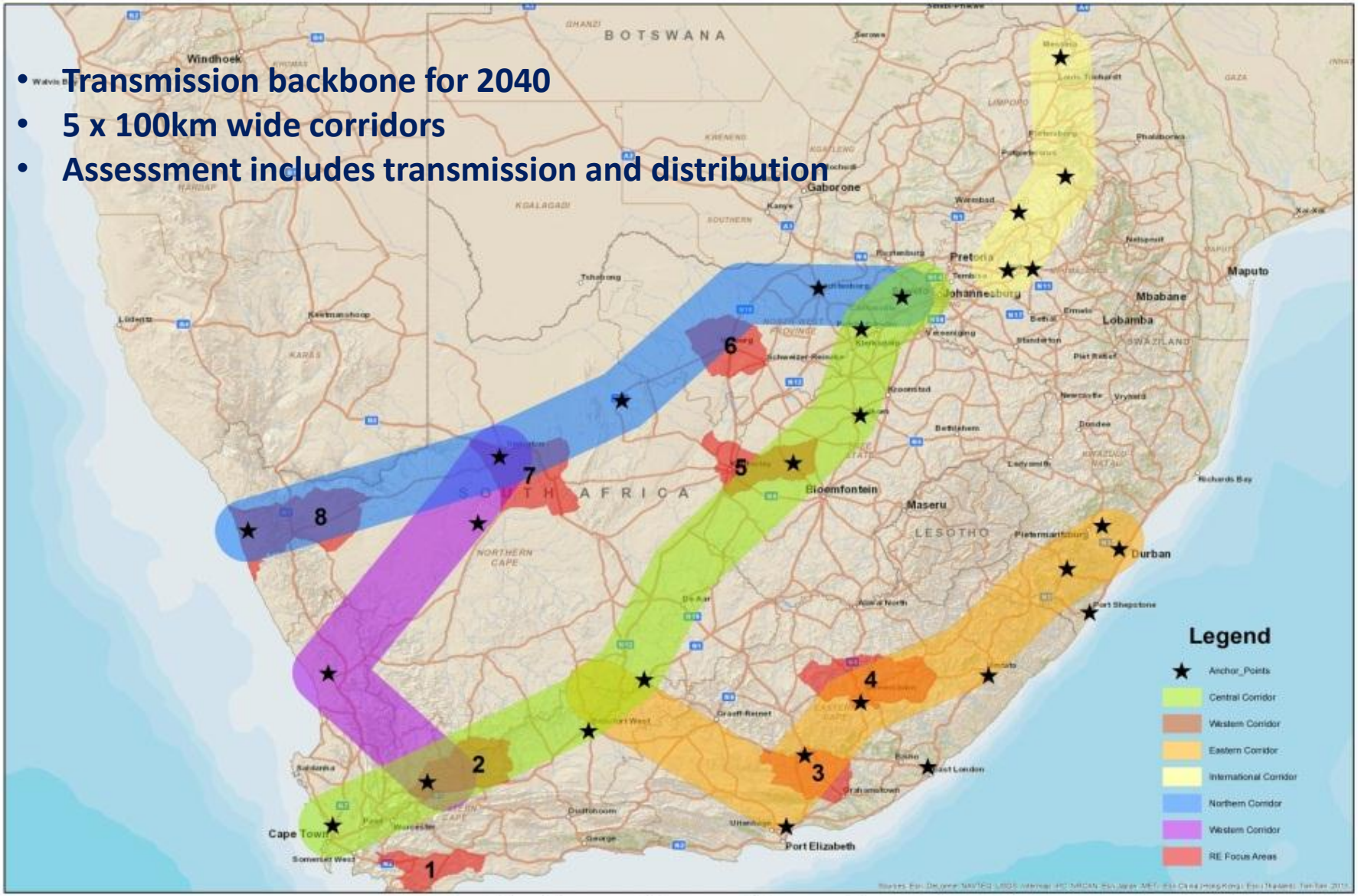
Marginal scenario difference for the IDP period

Inter-Province Power Transfers for IRP W60 CBA 2040 scenario



National Electrical Grid Infrastructure SEA_Working Corridors

- Transmission backbone for 2040
- 5 x 100km wide corridors
- Assessment includes transmission and distribution



Date: 13/02/2014

Approach to SEA

- No single approach to SEA can be applied to all circumstances
- Set of common principles for the application of SEA *(Guideline Document: Strategic Environmental Assessment in South Africa, DEAT and CSIR, 2000)*

Content	Process
• Sustainability	• Flexible
• Opportunities and constraints	• Strategic
• Levels of environmental quality	• Participative
	• Alternatives
	• Precaution and continuous improvement

- Three broad categories of SEA:
  - Policy SEA
  - Spatial plan and regional SEA
  - Sector plan and programme SEA

EGI SEA APPROACH

Phase I (Jan-Sep 14)

Phase II (Oct –Mar 15)

Phase III (Apr-Dec 15)

Environmental Constraints Map

Sector Specific Inputs

Specialist Studies

Eskom Strategic Corridors

Phase 1 Mapping Outputs

Final Mapping Outputs

Engineering Constraints Map

Opportunities Map

Site Specific Protocol

Provincial Government Consultation

Local Government Consultation

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Environmental Constraints Map

- Impact of ‘EGI on the Environment’
- A strategic level, GIS map that spatially represents the location and level of constraints associated with environmental features within the corridors
- Features considered can be separated into three categories:
  - The biophysical impact on the natural environment
    - Protected areas
    - Birds
  - The impact on the cultural or heritage significance of certain areas
    - World Heritage sites
    - National Heritage sites
  - Land use- areas zoned for land uses of strategic or national importance
    - Square Kilometre Array

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Environmental Constraint Categories

- Features categorised according to four levels of sensitivity as follows:

Impact on EGI on Environment: Constraints Categorisation	
Level of Constraint	Description
'No- Go'	The area is rated as extremely sensitive to the negative impact of development. As a result the area will either have **very high conservation value, very high existing/ potential socio-ecocomic value or hold legal protection status.**
High	The area is rated as being of high sensitivity to the negative impact of 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 development. As a result the area will either have mediums 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.

Engineering Constraints Map

- Impact of ‘Environment on EGI’
- Identifies engineering constraints which are likely to impact on the life-time cost (both construction and maintenance) for the development of EGI in certain areas within the corridor
- Eskom line engineering team provided inputs into cost assumptions and classifications
- Cost impact of each constraint feature compared against a baseline cost index
- Baseline Cost Index: *Lifetime cost associated with the construction and maintenance of 1km of 400kV line over a 20 year period assuming optimal environmental conditions for construction and maintenance.’*
- Each constraint feature was introduced to the above scenario to determine impact on ‘BLC index’

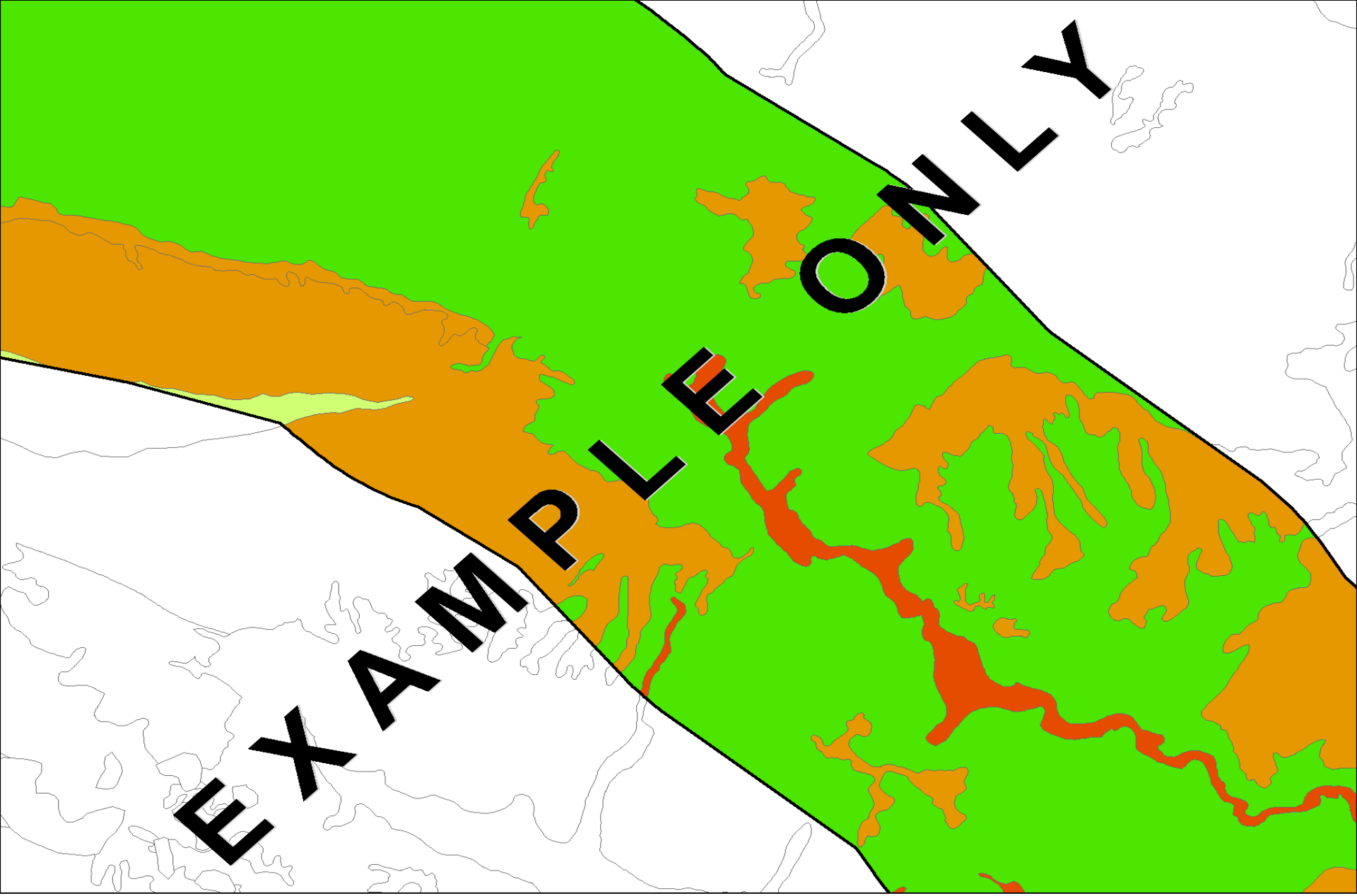
Engineering Constraint Categories

- Features categorised according to four levels of sensitivity as follows:

Impact of Environment on EGI: Constraints Categorisation	
Level of Constraint	Description
'No- Go'	The lifetime cost associated with development in this area is **>3 times BLC index.**
High	The lifetime cost associated with development in this area is between **2 and 3 times the BLC index.**
Medium	The lifetime cost associated with development in this area is between **1.5 and 2 times the BLC index.**
Low	The lifetime costs associated with development in this area is **< 1.5 times the BLC index.**

Opportunities Map

- Identification of development opportunities to enhance the economic and social component of the assessment
- Polarise the location of the corridors in the direction of national, regional or local economic or social development opportunities/priorities.
- Also identify key ‘pull’ factors for route placement within the corridors to maximise benefit and reduce negative impacts:
  - Recycling of existing transmission lines
  - Aligning to existing linear developments
  - Make use of existing servitude purchases
  - Seek out visual screening opportunities
  - Target degraded/transformed land
- Input from government (provincial and local) essential to understanding pull factors


EXAMPLE ONLY
N
0 2.5 5 10 Kilometers
1:156 000
1 2 3 4

Consultation Process

Type	Phase I	Phase II	Phase III
Expert Reference Group	→	→	→
Project Steering Committee	→	→	→
Provincial Government Consultation	→		
Local Government Consultation		→	
Sector Specific Consultation		→	
Online Consultation	→	→	→

Next Steps

- **Phase I completion**
- Complete environmental data gathering exercise;
  - Input from provincial government, parastatals, NGOs
- Complete engineering sensitivity qualification exercise;
  - Eskom Line Engineering Team
- Undertake preliminary opportunities mapping exercise
  - Review of IDPs and SDFs
  - Digitise spatial data

- **Phase II planning**
- Identify key sector stakeholders,
- Local Government consultation

Thank You

Any Questions?

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