environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

CSIR
our future through science

SANBI
Biodiversity for Life

Eskom

DEA National Electricity Grid Infrastructure Strategic Environmental Assessment

IAIA Conference 2014

28th August 2014

Presenter: Marshall Mabin

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

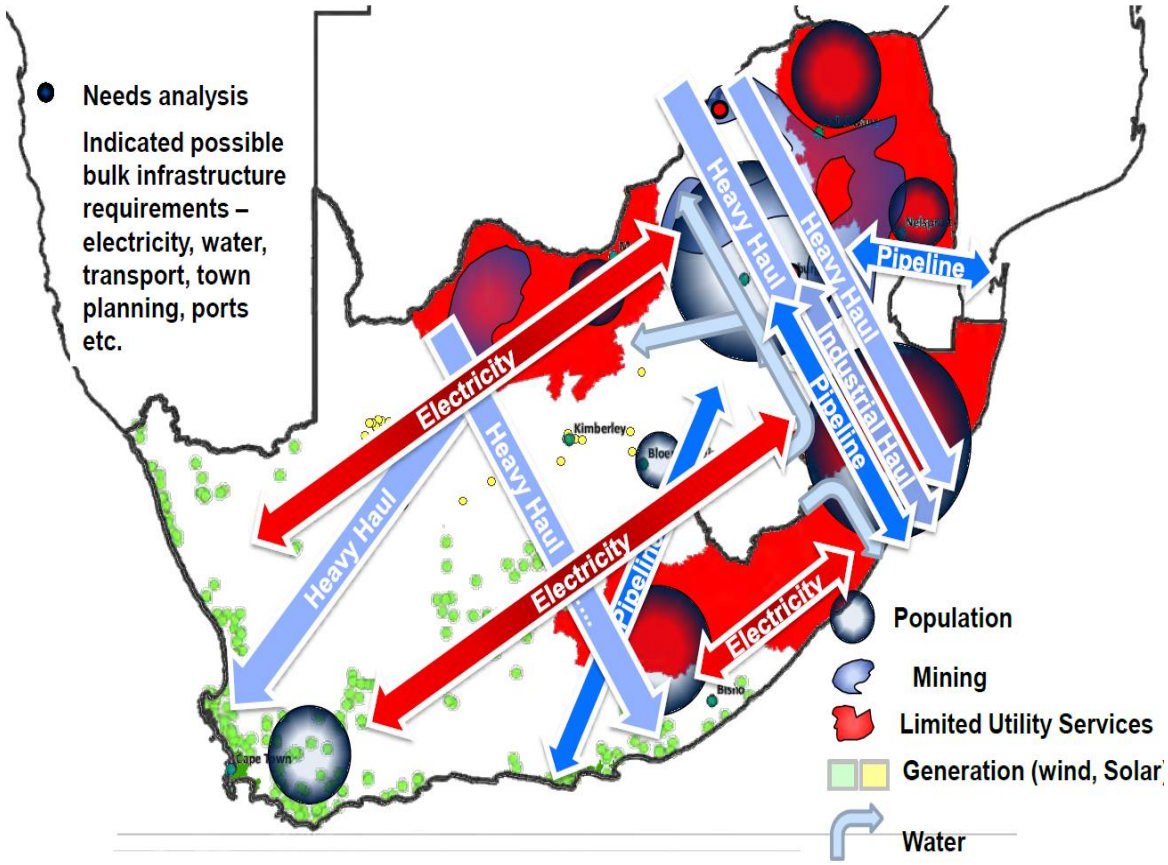
CSIR
our future through science

SANBI
Biodiversity for Life

Eskom

Strategic Integrated Projects (SIPs)

Needs analysis of infrastructure to support economic development and trade whilst simultaneously addressing the needs of the poor



Eskom

SANBI Biodiversity for Life

environmental affairs
Department: Environmental Affairs
REPUBLIC OF SOUTH AFRICA

CSIR our future through science

Three energy related SIPs

SIP 8: Green energy in support of the South African economy

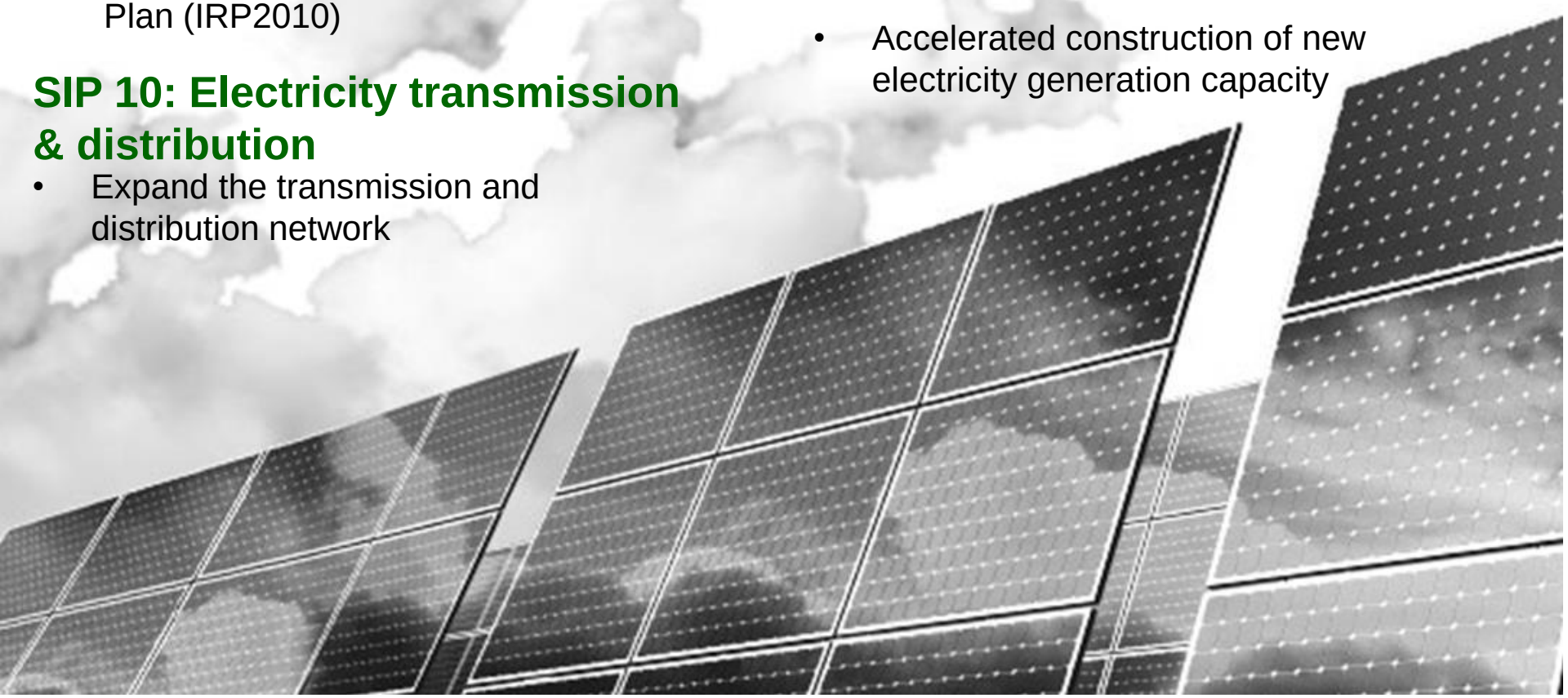
- Roll out of the Integrated Resource Plan (IRP2010)

SIP 9: Electricity generation to support socioeconomic development

- Accelerated construction of new electricity generation capacity

SIP 10: Electricity transmission & distribution

- Expand the transmission and distribution network



Eskom

SANBI Biodiversity for Life

environmental affairs
Department: Environmental Affairs
REPUBLIC OF SOUTH AFRICA

CSIR our future through science

Electrical Grid Infrastructure SEA Project Team

Project Coordinator: DEA

Dee Fischer Project Coordinator	**Surprise Zwane** Project Manager

Project Partner: Eskom

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

Environmental Consultants: CSIR

Paul Lochner SEA Project Leader	**Marshall Mabin** EGI SEA Project Manager

Joint Service Provider: South African National Biodiversity Institute

Jeffrey Manuel and Fahiema Daniels

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

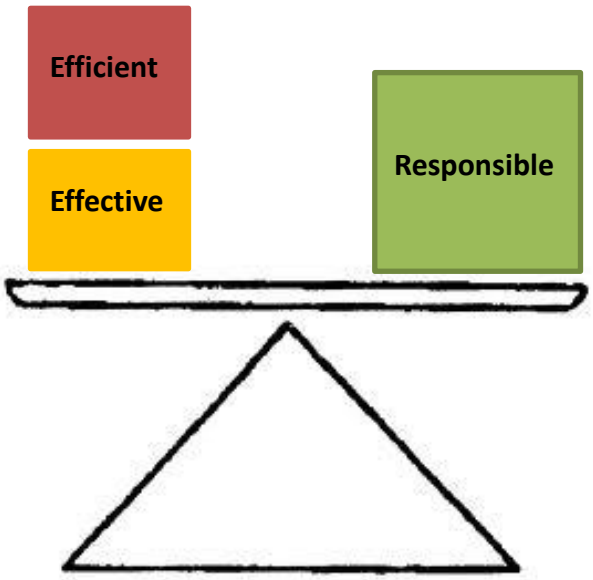
Eskom

SANBI
Biodiversity for Life

CSIR
our future through science

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.*



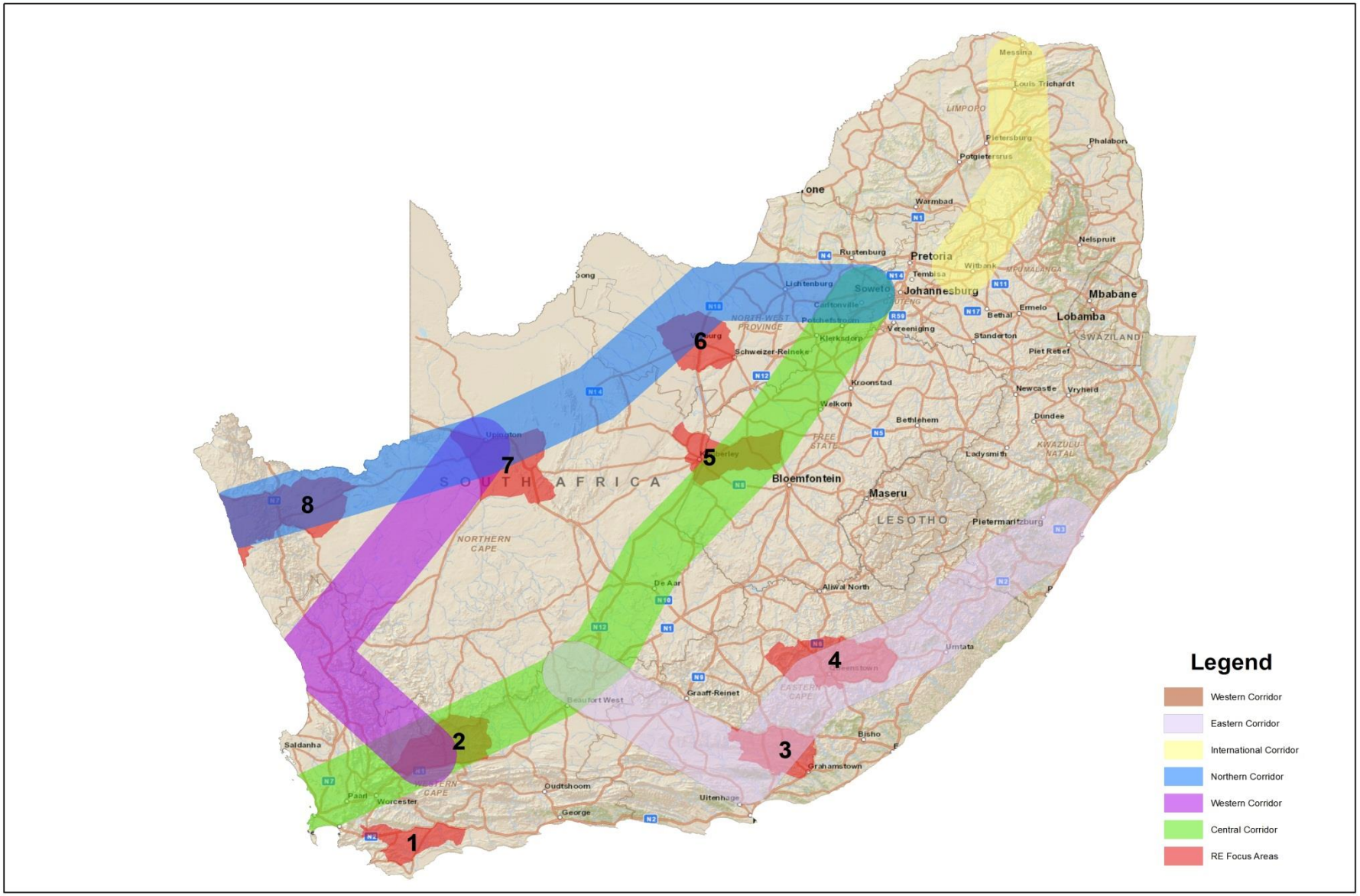
Objectives of the SEA:

- Identify strategic corridors which support electricity transmission needs up to 2040.
- Refine the corridors based on high level suitability from an environmental, economic and social perspective.
- Facilitate streamlined environmental authorisation for transmission infrastructure development within the corridors
- Promote collaborative governance between authorising authorities
- Develop a site specific development protocol.
- Enable Eskom greater flexibility when undertaking land negotiation.
- Support upfront strategic investment

Identifying Strategic Corridors for EGI

- Eskom Strategic Grid Plan Study: Formulates long term strategic transmission corridor requirements for 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
  - **Increased Import Scenario**
    - Double imported power by 2030
- Energy power demand and supply deficit and excesses was assessed for each scenario
- Assessed per Province and within Provinces
- Results identify potential grid expansion requirements

National Electrical Grid Infrastructure SEA_Working Corridors



environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

CSIR
our future through science

SANBI
Biodiversity for Life

Eskom

Date: 03/02/2014

EGI SEA APPROACH

Phase I (Jan-Aug 14)

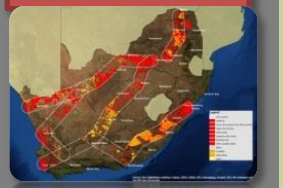
Phase II (Aug – Feb 15)

Phase III (Mar-Dec 15)

Environmental Constraints Map

Eskom Preliminary Corridors

Engineering Constraints Map



Final Corridors

Specialist Studies

Demand Map

Final Corridors

Environmental Sensitivity Map

Development Protocol

Participation

Environmental Constraints Map

- Impact of 'Transmission Infrastructure on the Environment'
- A GIS based spatial mapping exercise to determine very high sensitive environmental features within and in proximity to the preliminary Eskom corridors;
- Broad range of environmental features considered as part of the sensitivity assessment, including:

- Biophysical:
  - Conservation areas
  - Endangered and sensitive habitats
  - IBAs
- Cultural
  - Archaeological sites
  - Proclaimed natural heritage sites
- Socio Economic
  - Square Kilometre Array
  - Runway restrictions
  - Tourist routes
  - Game farms and hunting areas

Engineering Constraints Map

- Impact of 'Environment on Transmission Infrastructure'
- ***'A feature (natural or unnatural) which represents a <u>significant cost to Eskom</u> when developing or operating transmission line infrastructure on or in proximity to that feature'.***
- Baseline Cost Index (BCI) or '**X**': represents optimal development/operating conditions i.e. best case cost scenario
- '***Lifetime cost associated with the development and operation of 1km of 400kV line over a 20 year period assuming optimal development and operating conditions'***
- Types of engineering constraints include:
  - Urban areas
  - Intensive agricultures
  - Coast
  - Mining areas
  - Slope
  - Dolomite

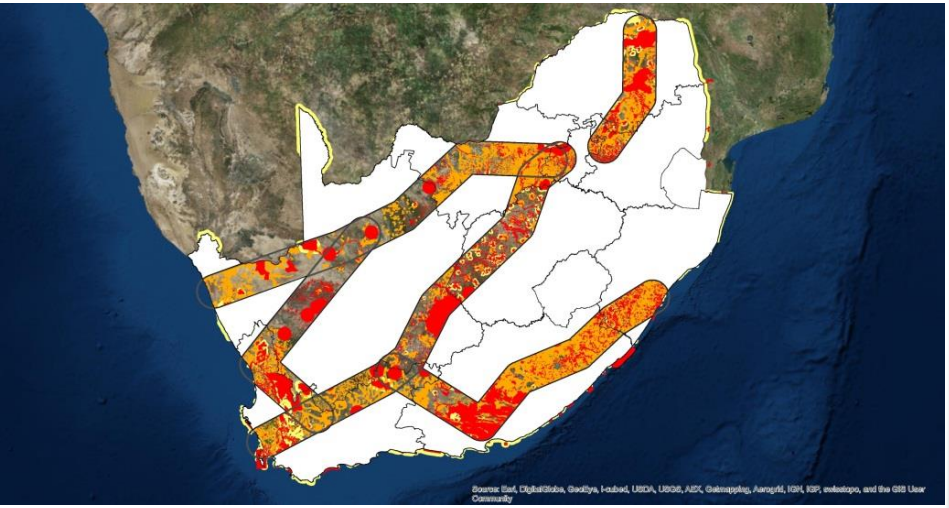
environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

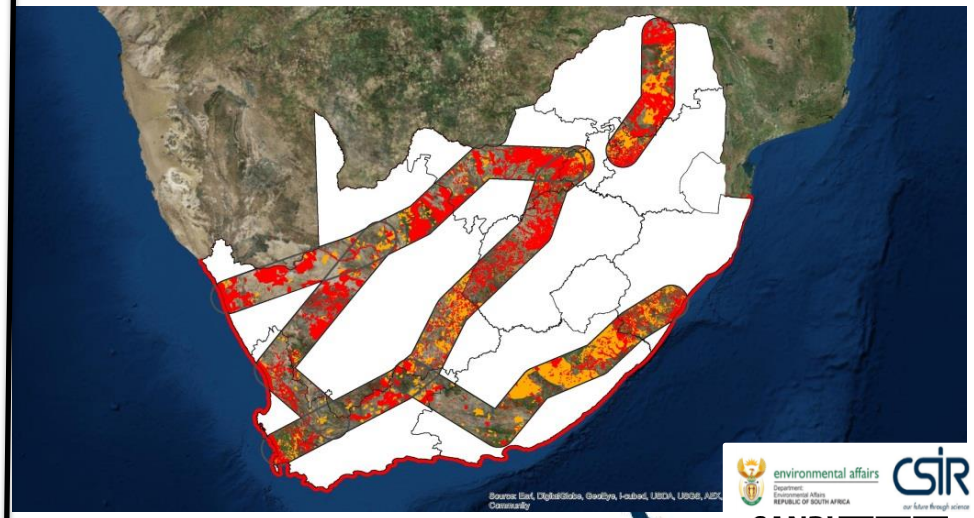
CSIR
SANBI Biodiversity for Life
Eskom

Constraints Categories and Draft Mapping Outputs

Environmental Constraints Categories	
Level of Constraint	**Description**
Very High	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 eixisting/ 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 Categories		
Level of Constraint	Description	BCI Rating
Very High	The lifetime cost associated with development in this area is **>150% the BCI**.	>1.5X
High	The lifetime cost associated with development in this area is **between 120% and 150% the BCI**.	>1.2X<1.5X
Medium	The lifetime cost associated with development in this area is **between 100% and 120% the BCI.**	>1X<1.2X
Low	Baseline Cost Index (BCI)	1X





Demand Mapping Process

Demand (Positive) Mapping

- Determining where the electricity (or the evacuation thereof) is needed;
- Information gathering will comprise:
  - Desktop review of local government and provincial planning documentation;
  - Industry bulk energy user/producer workshop and exercise;
  - Consultation with local government;
  - Engagement with national departments;
- Information to be digitised into GIS format.

Corridor Refinement Process

Demand Layer

+

Engineering Constraints Layer

+

Environmental Constraints Layer

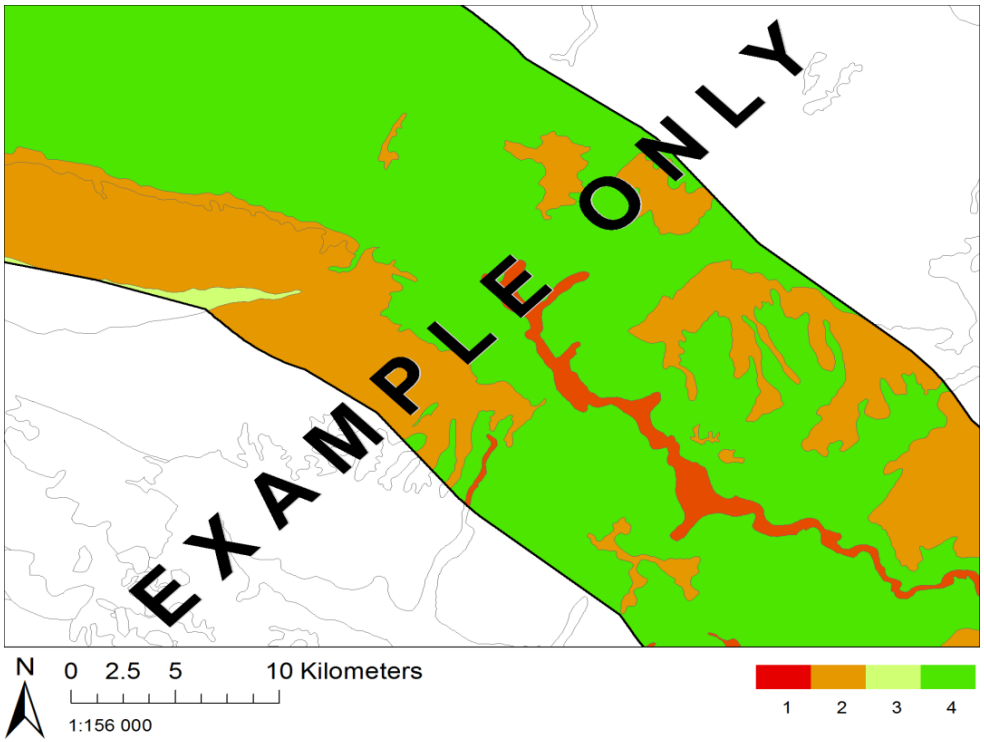
+

=

Optimal Corridor Positioning

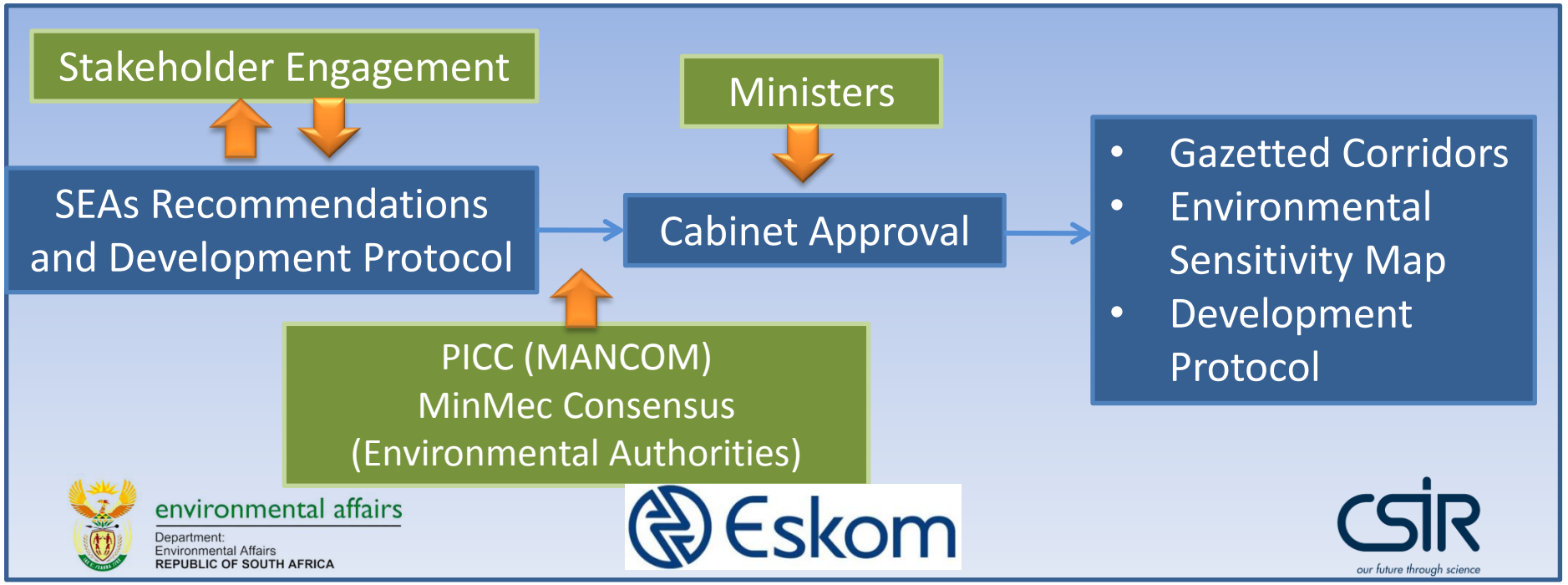
Phase III

- **Specialist Studies**
  - Undertake scoping level assessment of area within the corridors;
    - Ecological Assessment
    - Bird Assessment
    - Heritage Assessment
    - Visual Impact Assessment
  - Create sensitivity map for each assessment type in each of the corridors
  - Assist in the creation of the development protocol
    - Specifies minimum assessment requirements
    - Proposed mitigation measures



environmental affairs
CSIR
SANBI
Biodiversity for Life
Eskom

Cabinet Approval Process



Thank you for your attention

DEA National Electricity Grid Infrastructure SEA to facilitate the efficient and effective expansion of key strategic transmission infrastructure in South Africa

Webpage: https://egi.csir.co.za/

Marshall Mabin
CSIR Environmental Management Services
Tel: 021 888-2490 / Fax: 021 888-2693
Email: mmabin@csir.co.za