



# Development of a Strategic Environmental Assessment for the Identification of Energy Corridors, as well as Assessment and Management of a Gas Pipeline Network for South Africa

## ROADSHOW

08 – 22 October 2018

**SANBI**  
Biodiversity for Life  
South African National Biodiversity Institute

**CSIR**  
our future through science

# Meeting Agenda

- Background on the Phased Gas Pipeline Network and EGI Corridors
- Pinch Point Analysis
- Biodiversity Assessment (Terrestrial and Aquatic Ecology)
- Seismicity Assessment and Visual Impact Assessment
- Socio-economic, settlement planning, disaster management
- Demand Mapping

# BACKGROUND TO THE PGPN AND EGI EXPANSION SEA

# CONTEXT – ENERGY INFRASTRUCTURE



NATIONAL  
DEVELOPMENT  
PLAN  
2030

## National Development Plan

### Operation Phakisa

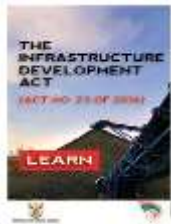
**18 SIPs - unlock strategic development potential from project-level, municipal infrastructure to national scale projects – PICC**

SIP 8 – Green Energy in support of the South African economy

SIP 9 – Electricity Generation

SIP 10 – Electricity Transmission and Distribution for all

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



### OFFSHORE OIL AND GAS EXPLORATION LAB

**August 2014**

*South Africa should ...*

... create an environment that *promotes exploration* ...

... in order to *drill 30 exploration wells* in the next 10 years

... while simultaneously *maximising the benefits for South Africa*

# Need for the SEA

- Other Drivers
  - Importation of LNG (via the LNG to Power Program)
  - Imported Gas from Mozambique
  - Potential Shale Gas developments in the Karoo Region
  - To support the identification of gas as a contributor to the energy mix (draft 2018 IRP).
    - ❖ Gas: 8,100 MW by 2030 (16% of installed capacity).
    - ❖ PV: 5,670 MW (10%) & Wind: 8,100 MW (15%)



**From an Environmental legislative perspective DEA is responding to planning requirements through SEAs**

- The SEA is therefore needed in order to:
  - support objectives of Operation Phakisa and the SIPs.
  - accelerate the gas to power programme.
  - be proactive rather than reactive with regards to planning for infrastructure.
  - ensure that when required, environmental authorisations are not a cause for delay.

**Table 2 IRP 2018: Proposed Updated Plan for the Period Ending 2030**

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
<b>TOTAL INSTALLED</b>	<b>33 847</b>	<b>1 860</b>	<b>4 696</b>	<b>2 912</b>	<b>7 958</b>	<b>11 442</b>	<b>600</b>	<b>11 930</b>	<b>499</b>	<b>2600</b>
<b>Installed Capacity Mix (%)</b>	<b>44.6</b>	<b>2.5</b>	<b>6.2</b>	<b>3.8</b>	<b>10.5</b>	<b>15.1</b>	<b>0.9</b>	<b>15.7</b>	<b>0.7</b>	



Installed Capacity



Committed / Already Contracted Capacity



New Additional Capacity (IRP Update)



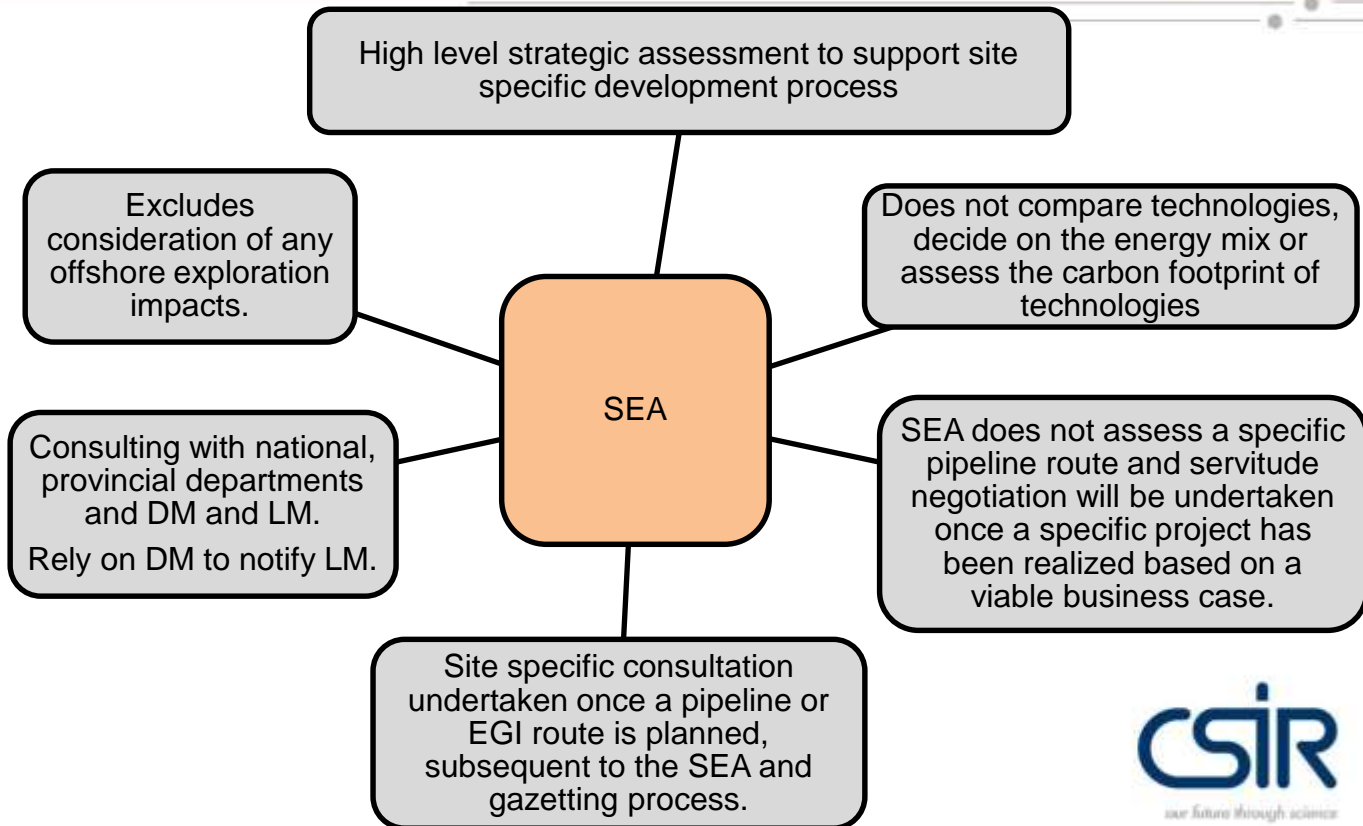
Embedded Generation Capacity ( Generation for own use allocation)

Source: Department of Energy (2018). Integrated Resource Plan 2018.

# SEA Project Team

<u>Project Coordinator: DEA</u>			
Dee Fischer Project Coordinator		Simon Moganetsi Project Manager	
<u>Project Partners</u>			
DoE iGas		DPE Transnet, Eskom	
<u>Environmental Consultants: CSIR</u>			
Paul Lochner Project Advisor	Annick Walsdorff Project Leader	Rohaida Abed Project Manager	Samukele Ngema Babalwa Mqokeli Project Intern
<u>Joint Service Provider: South African National Biodiversity Institute</u>			
Jeffrey Manuel Director Biodiversity Information and Planning	Fahiema Daniels Deputy Director: Biodiversity Planning	Tsamaelo Malebu GIS specialist	

# Considerations for the SEA Process





# Vision of SEA: Development of a Strategic gas pipeline network and expansion of the gazetted EGI in an environmentally responsible and efficient manner that responds effectively to the country's economic and social development needs.

## Effective

- Identify strategic energy corridors at a national scale based on future energy supply and demand requirements, environmental sensitivities as well as social and economic development priorities at a national, regional and localised level.

## Efficient

- Streamline the authorisation process by pre-assessing environmental sensitivities to avoid fatal flaws and focus on the site specific level of assessment required. Exemption from EA Process within the pre-assessed corridors
- Enable developers greater flexibility in terms of route options within the assessed corridors (i.e. avoid land negotiation concerns).
- Promote collaborative governance between authorising authorities.

## Responsible

- Develop a generic EMP, site specific development protocol, and standards.

# Overview of SEA Process

Key Stakeholders Consultation  
ERG, PSC, Sector Specific Meetings

Public outreach 1

Public outreach 2

## PHASE 2: Assessment

## PHASE 3 Decision-support outputs and Gazetting

PHASE 1:  
Inception

**Task I**  
Initial Corridors  
(Starting Point)  
June 2017

Preliminary  
Corridors



**Task II**  
(Negative Mapping)  
Sept-Oct 2017

W2W  
Environmental  
Constraints Map



W2W  
Engineering  
Constraints Map



**Task III**  
(Corridor Refinement)  
Nov 2017 – Jan 2018

Draft  
Corridors



Draft Corridor  
Environmental  
Constraints Map



**Task IV**  
(Environmental Assessment)  
December 2017 – December 2018

Specialist  
Studies



We are here  
Draft Specialist  
Report Finalisation

Review and  
Final corridor  
alignments

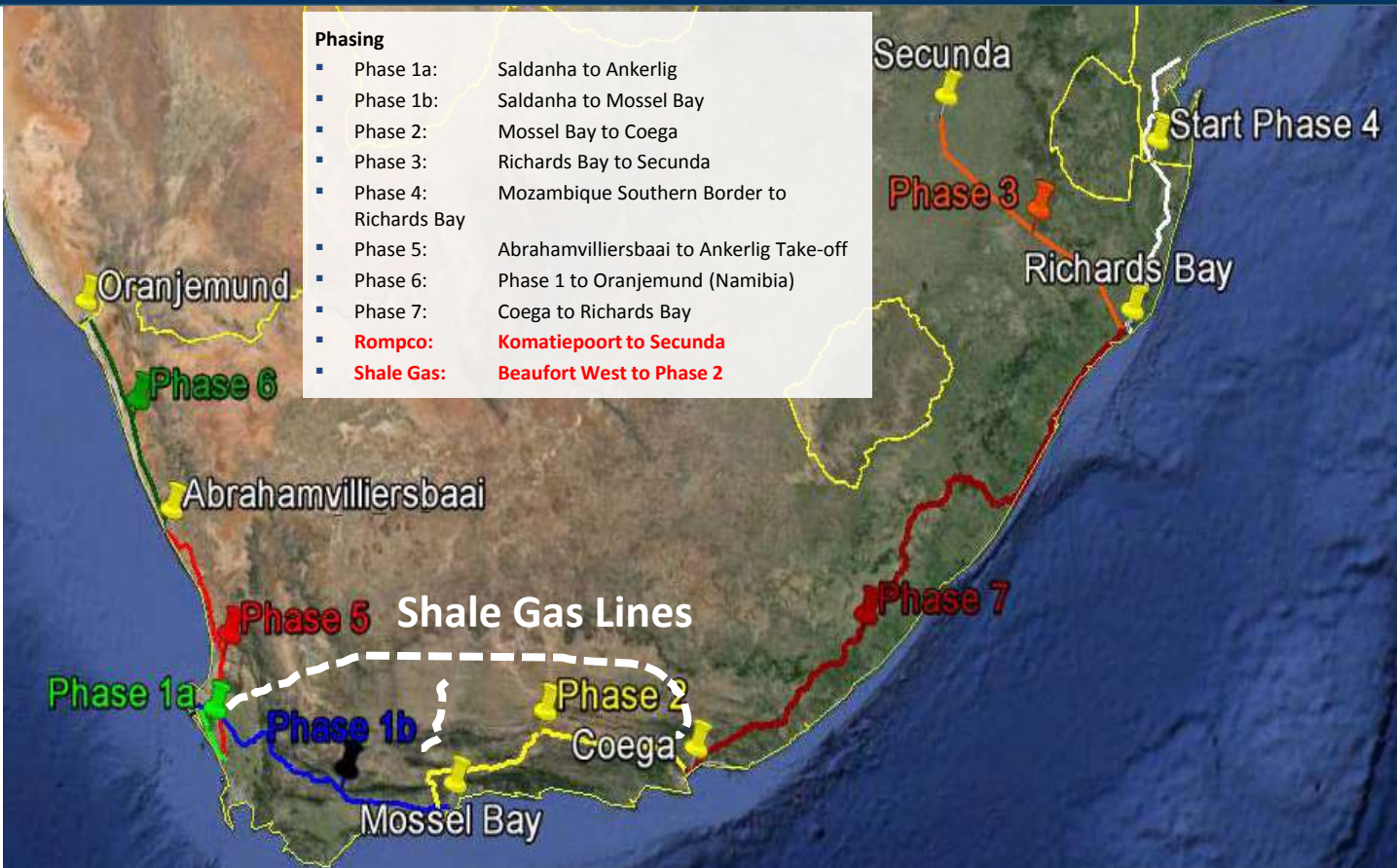
2019  
SEA Outputs

Final Corridors

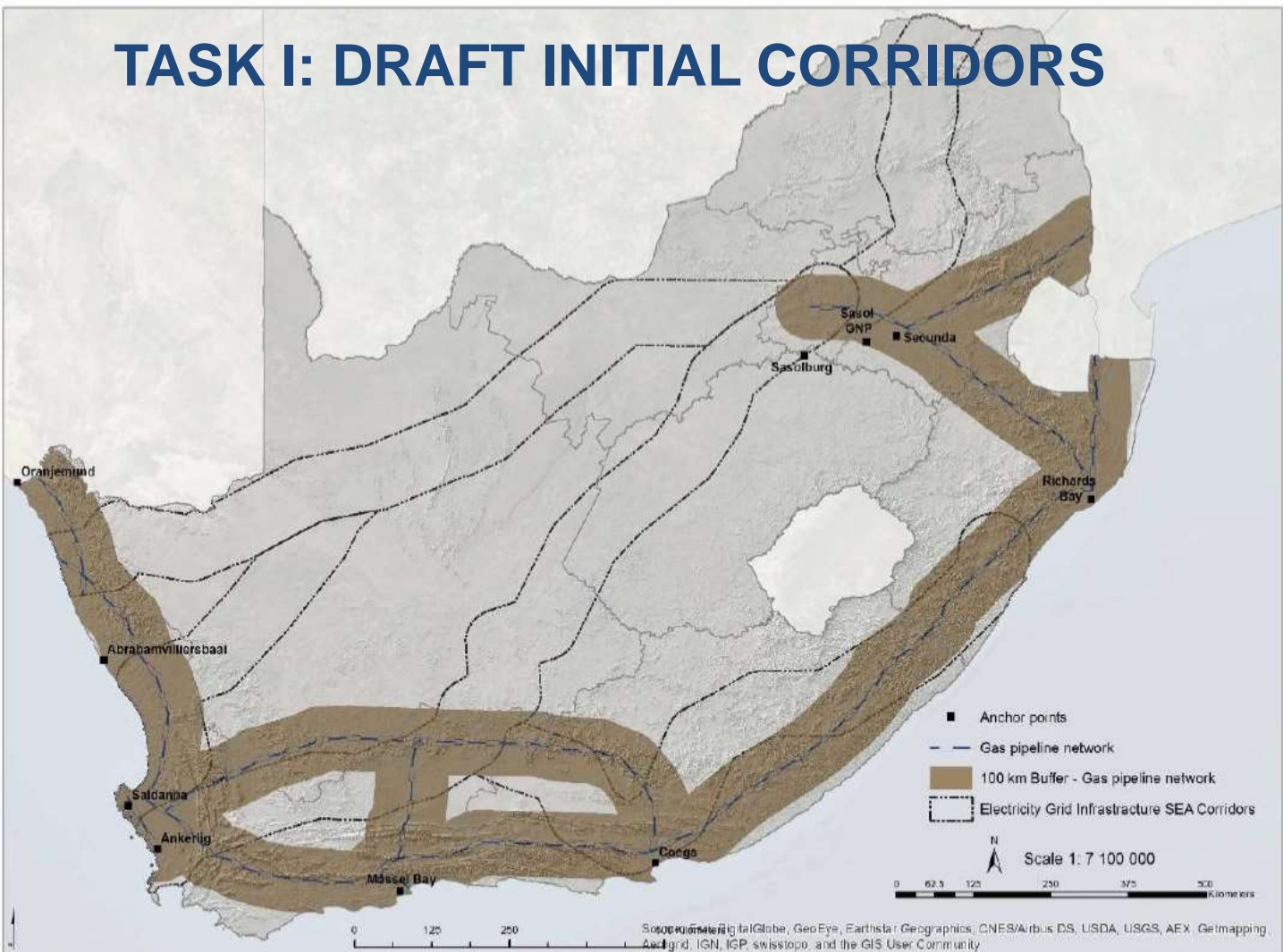
Final Corridor  
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Standards, EMPr  
and Protocols

# Phakisa A1 Phased Gas Pipeline Network



# TASK I: DRAFT INITIAL CORRIDORS



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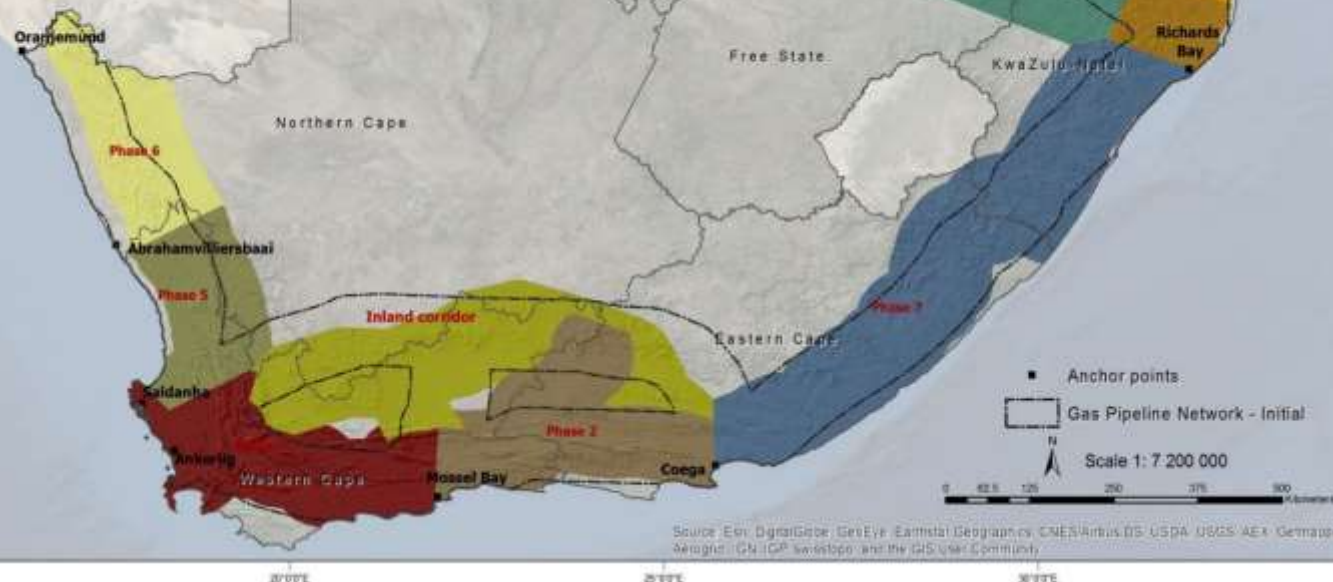
Standards, EMPr  
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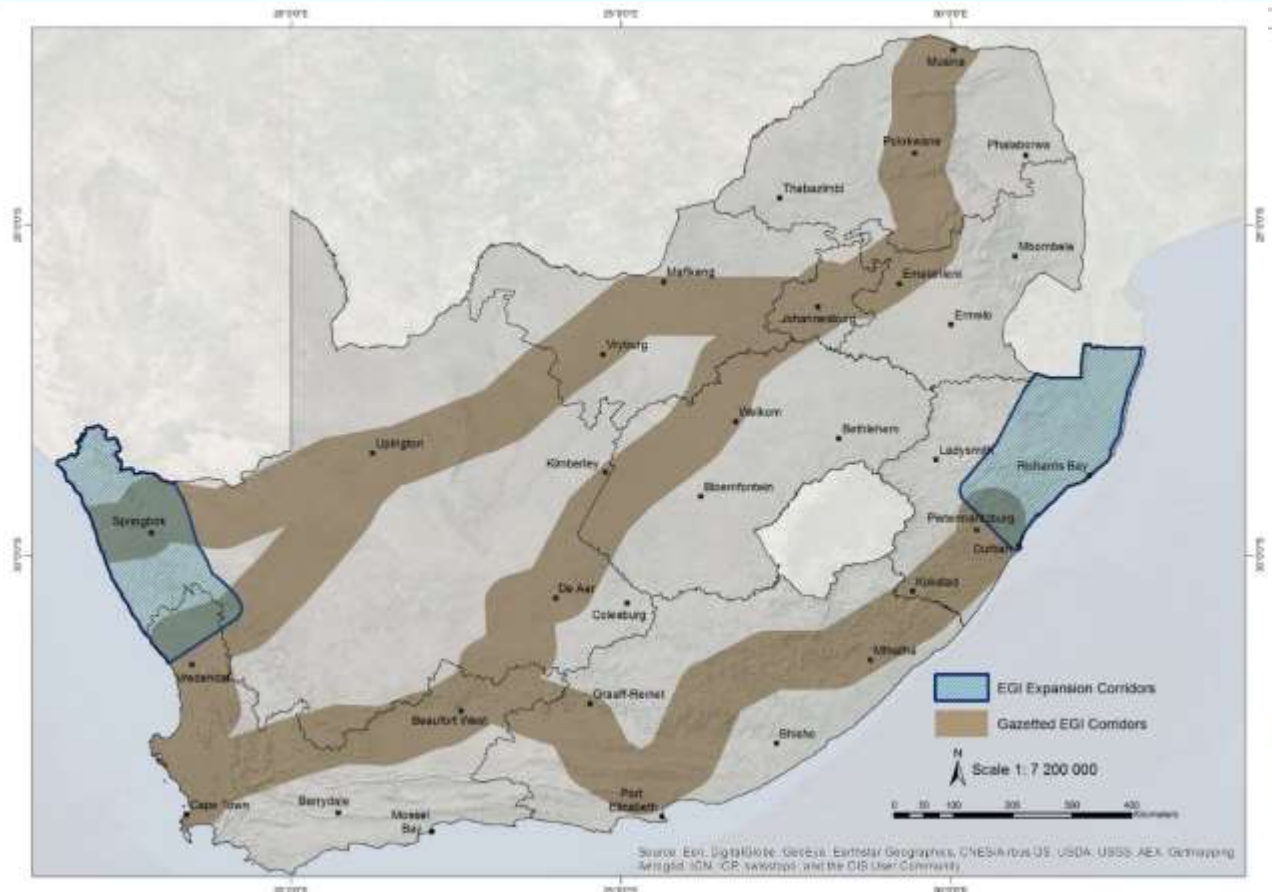
# TASK III: REFINED DRAFT CORRIDORS

Phased Gas Pipeline Network - Current

- Phase 1a & 1b
- Phase 2 & Shale Gas
- Phase 3
- Phase 4
- Overlap between Phase 3 & 4
- Phase 5
- Phase 6
- Phase 7
- ROMPCO corridor
- Inland corridor



## TASK III: DRAFT EGI EXPANSION CORRIDORS



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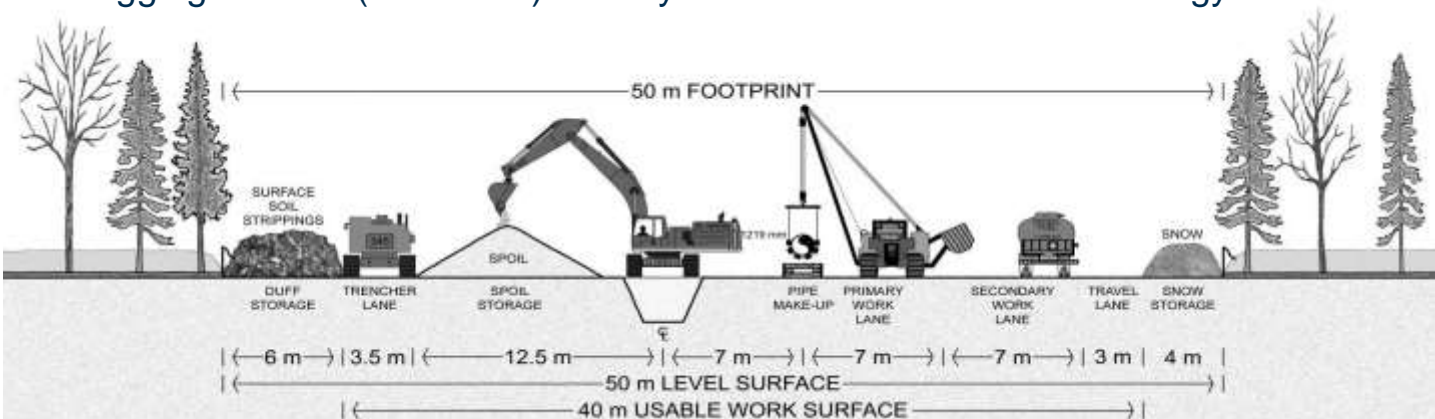
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and Protocols



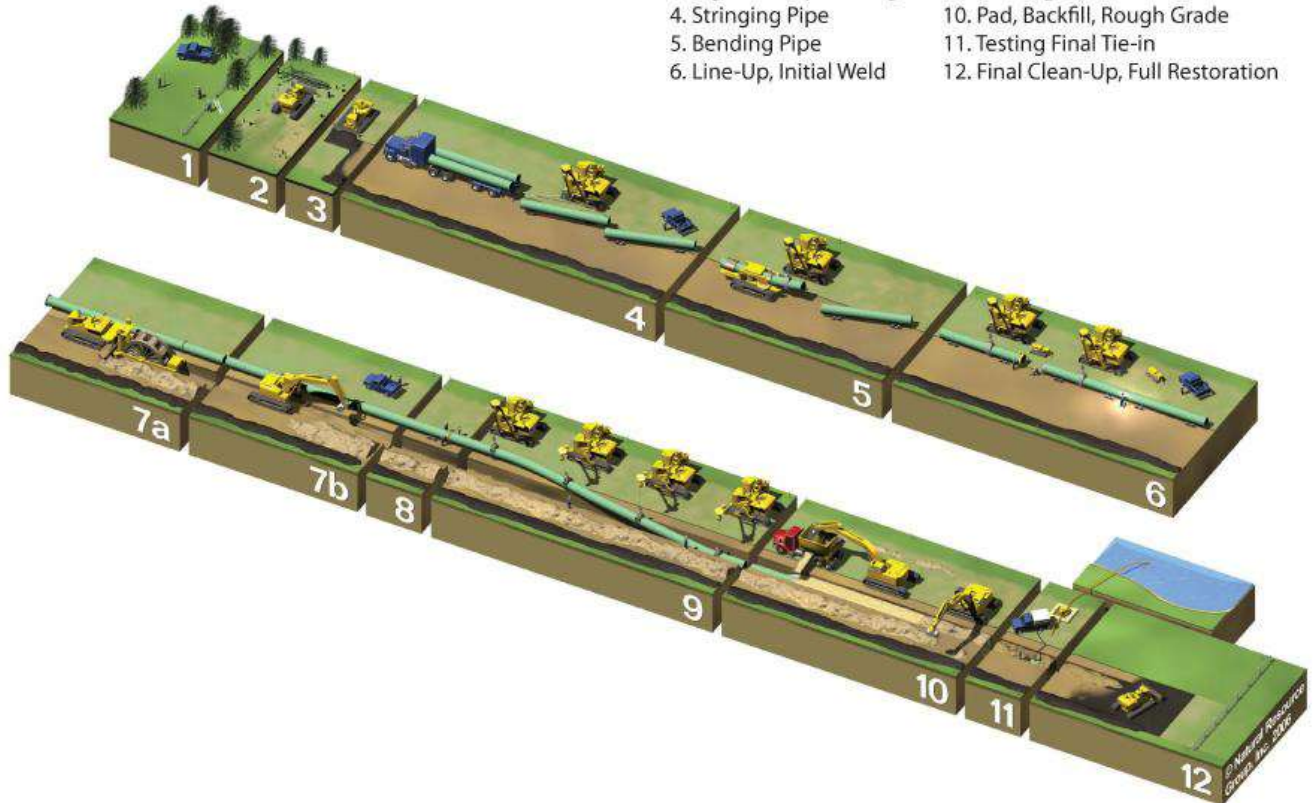
# Construction of Gas transmission pipelines

- Infrastructure: Underground Transmission pipelines (>15 bars, 660mm Diameter), Pigging stations, Block valves and Access roads
- Excludes compressor stations
- Nominal Right of Way (ROW) and Work Space
  - Temporary working space is needed for soil storage, ditch, pipe stock, and equipment
  - Construction ROW - typically 30 –50m
  - Permanent servitude – 10 m wide
- Construction camps – every 100 km
- Pigging stations (30 x 80 m) – every 250-500 km with new technology



# Construction of Gas transmission pipelines

1. Survey and Staking
2. Front-End Clearing
3. Right-of-Way Grading
4. Stringing Pipe
5. Bending Pipe
6. Line-Up, Initial Weld
7. Trenching
8. Final Coating and Inspection
9. Lowering Pipe into Trench
10. Pad, Backfill, Rough Grade
11. Testing Final Tie-in
12. Final Clean-Up, Full Restoration



# Electricity Grid Infrastructure

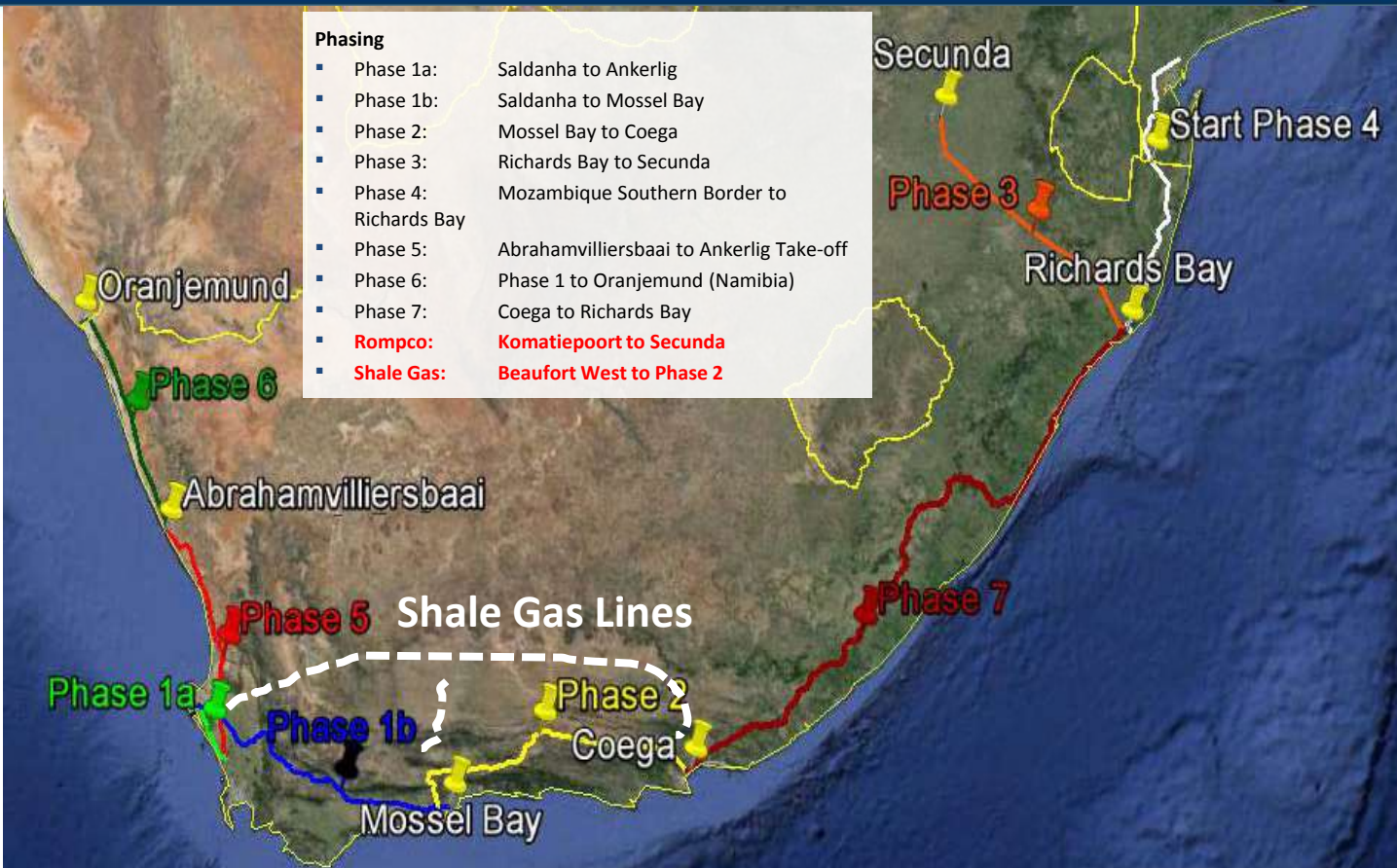
- Infrastructure –
  - pylons (up to 1ha during construction)
  - overhead powerline
  - access/service roads
  - substations (up to 40 ha): construction camps, borrow pits, temporary lay down areas.



Figure 1: Route Profile: Servitude and Development Envelope for a typical 765 kV power line (DEA, 2016)

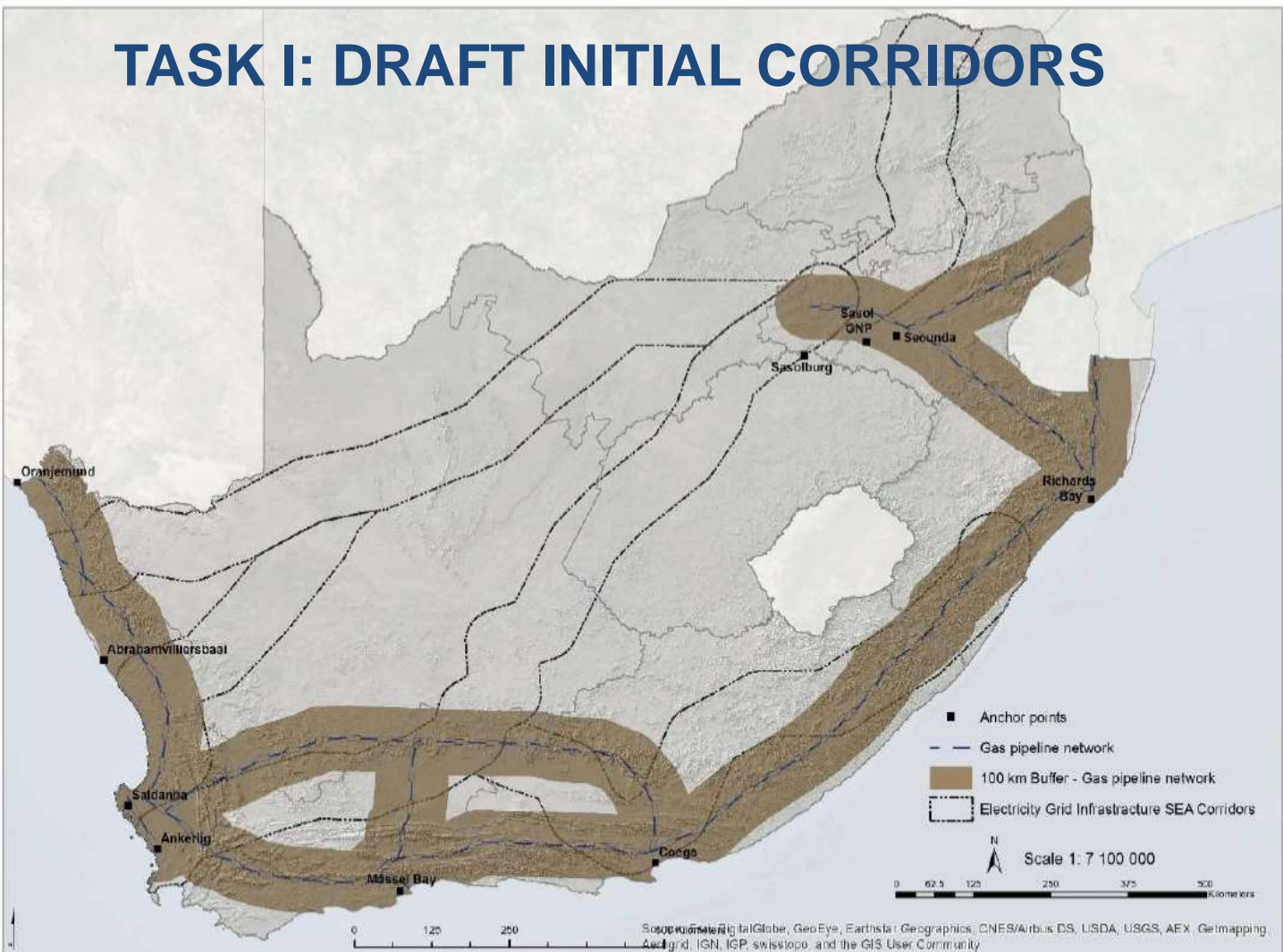
# Sensitivity and Pinch Point Analysis

# Phakisa A1 Phased Gas Pipeline Network





# TASK I: DRAFT INITIAL CORRIDORS



# Delineation process of Draft Corridors

- **Environmental & Engineering** features were used for the SEA.
  - Each feature was assigned a **sensitivity score** based on the developmental impacts on the environment & infrastructure.
- After the sensitivity mapping exercise, a **Pinch Point Analysis** was undertaken.
  - The analysis **identified** areas that might have little areas/space for routing of lines in the corridor.
  - Corridors were shifted to increase the areas available for routing of PGP or EGI
- **Draft corridors** were developed for the Specialist Assessment Phase.

# Environmental Sensitivities Examples

## Protected Areas

National Parks

Provincial NRs

Forest PAs

Special NRs

MCAs

PEs

PA expansion

PA buffers

## Terrestrial

Natural Forest

Threatened  
spp habitat

CBAs, Fauna

Threatened  
Ecosystems

## Freshwater

All wetlands

Rivers

Dams

Estuaries

## Degradation

Eroded areas

Soil erodibility

## Avifauna

IBAs

Colonies and  
roosts for large

Bat roosts

Bat ecoregions



Social

Economy

# Environmental Sensitivities Examples

## Production Landscape

Commercial  
Forestry

Forestry  
expansion

Deep rooted  
agriculture

Irrigation pivots >  
500m

Other agriculture  
fields

## Infrastructure and Industrial

SKA and SALT

Industrial areas

Roads

Railways

Pipelines

## Cultural Landscape

Heritage Sites

Landscape  
integrity

## Settlement

Urban areas

Formal  
settlement

# Engineering Constraints Examples

## Industry

SKA

Forestry

Urban

WULAs

Mining

## Natural Environment

Rivers &

Agriculture

Thicket

Dams &  
estuaries

Slope

## Specific EGI data

High fire

High wind

High snow

Pollution

Flooding

Eroded areas

## Specific for Gas

Geotechnical

Pollution

Fault lines and  
seismic data

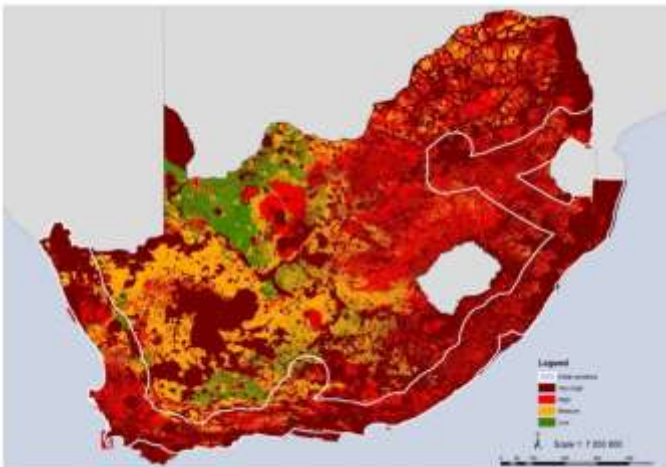
Water stressed  
catchments

# Sensitivity Categories

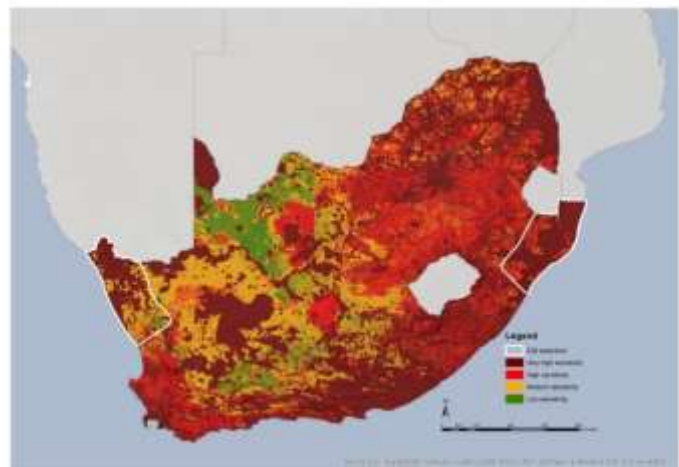
Constraint	Environmental
Very High	Area is rated as being extremely sensitivity to development. As a result the area will either have very high conservation or socio-economic value
High	Area is rated as being highly sensitivity to development. As a result the area will either have high conservation or socio-economic value
Medium	Area is rated as being of medium sensitivity to development. As a result the area will either have medium conservation or socio-economic value
Low	Areas considered to have low levels of sensitivity in the context of gas pipeline or EGI construction and maintenance

# Environmental Sensitivity Outputs

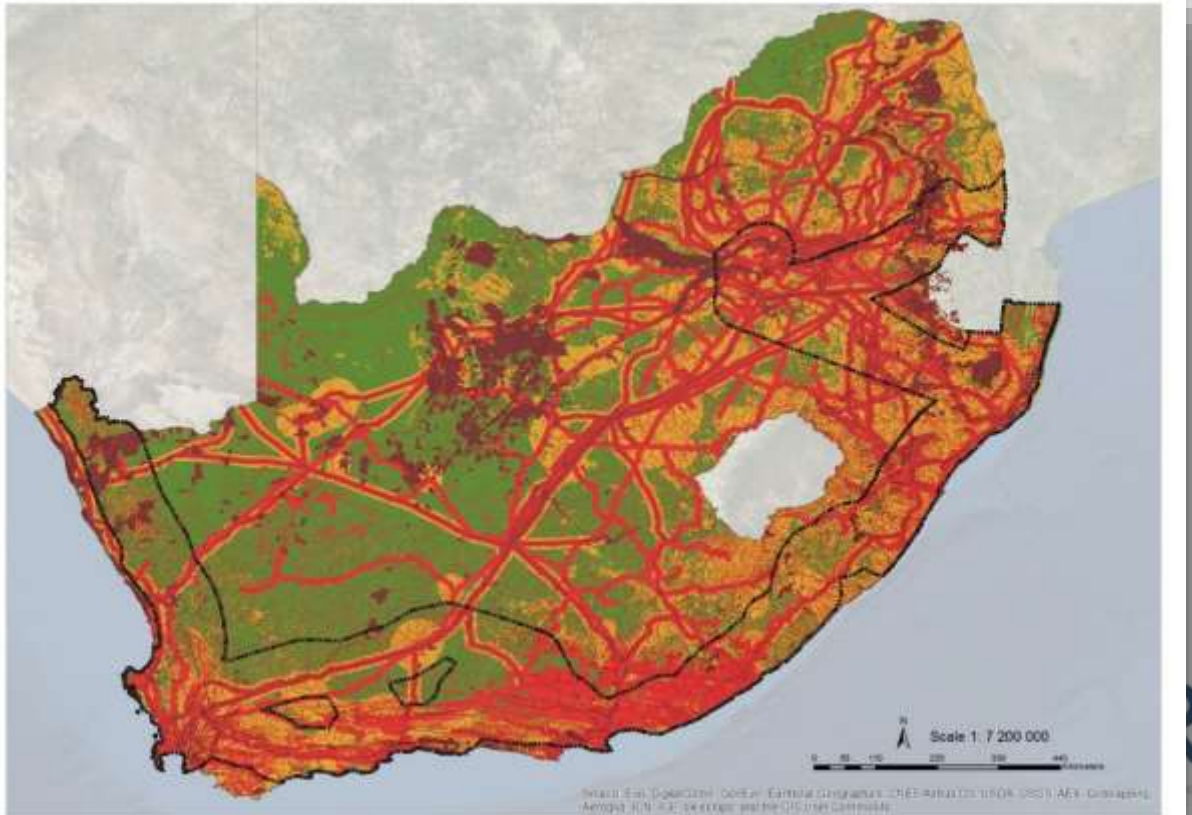
## Phased Gas Pipeline



## Electricity Grid Infrastructure (EGI)

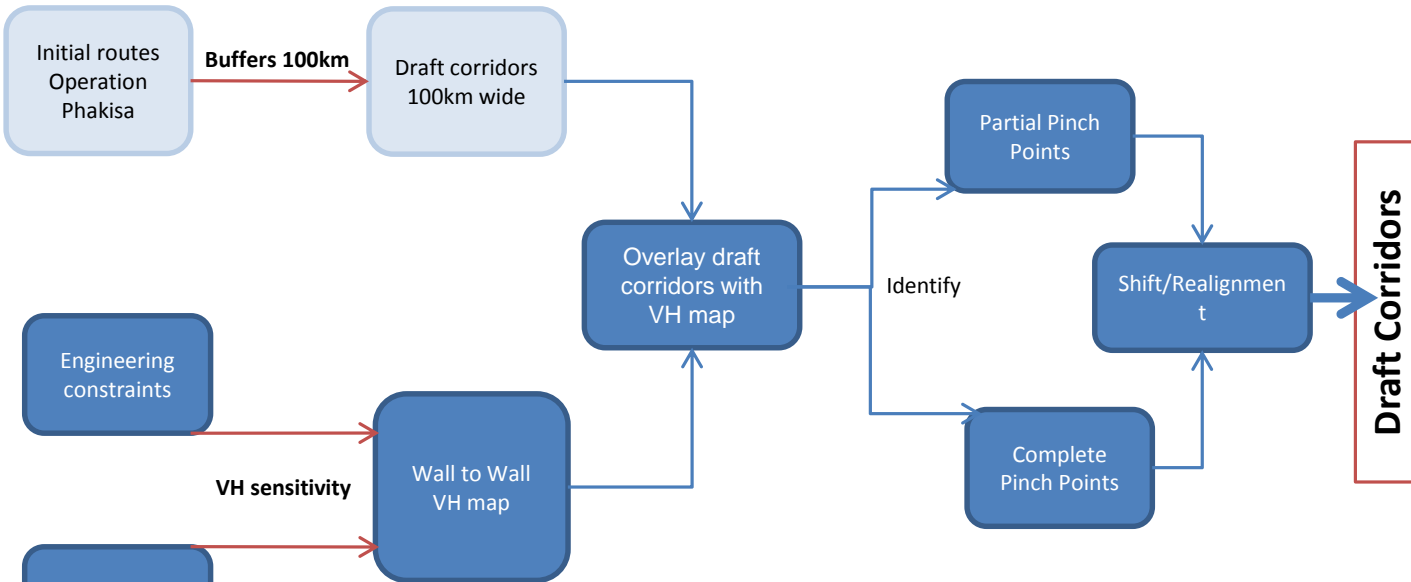


# Engineering Sensitivity Outputs



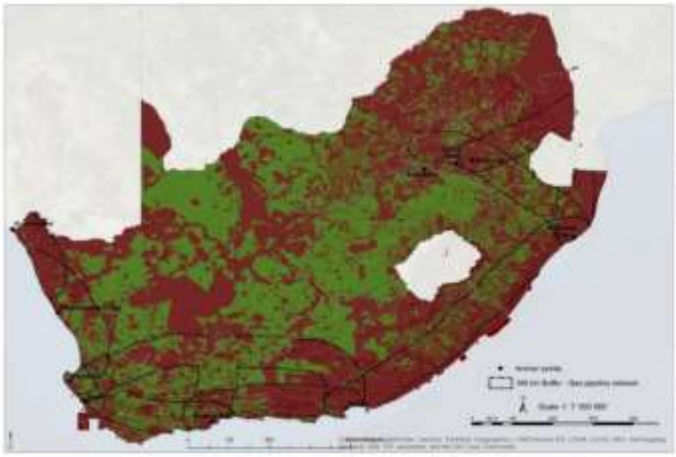
# Pinch Point Analysis

# Pinch Point Analysis Process

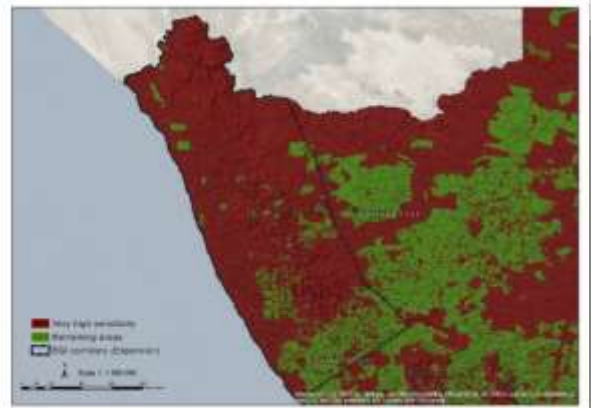
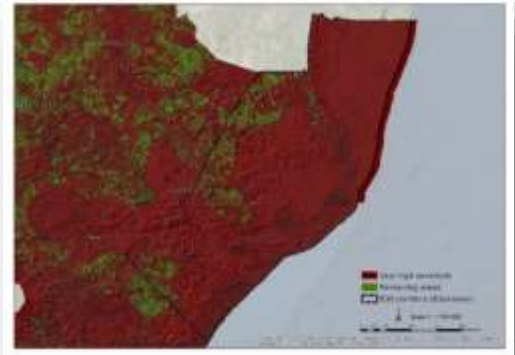


# Pinch Point Analysis Results

## Phased Gas Pipeline

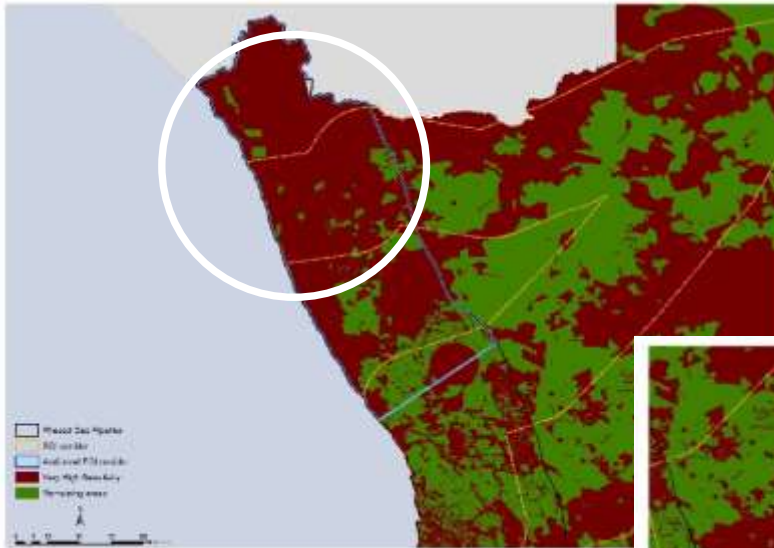


## Electricity Grid Infrastructure (EGI)





# Zoomed in areas – Gas Pipeline



Shift by 25 km inland  
due to mining



# Zoomed in areas - EGI



No shift because of  
Swaziland border

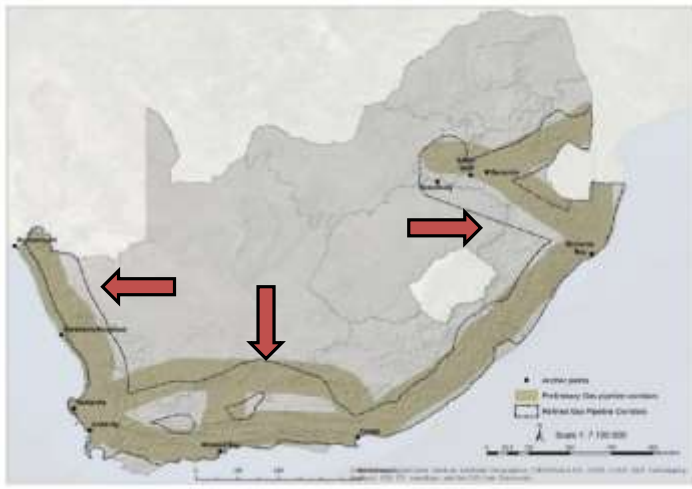


No shift because of:

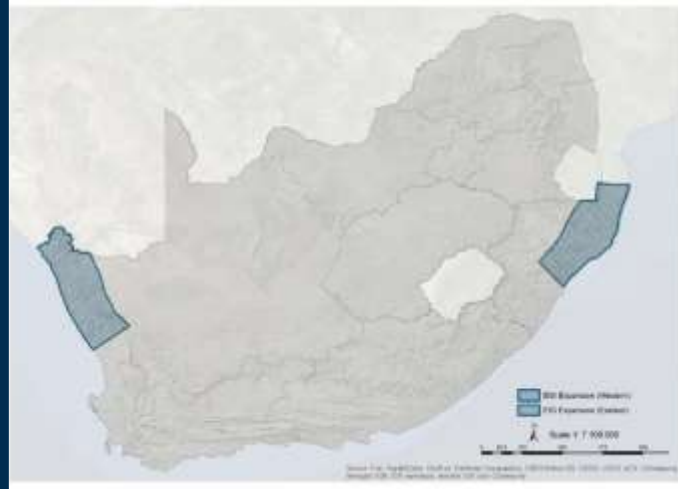
- Orange river width inward
- Location of substation
- Location of transmission line

# Adjustments to Draft Corridors

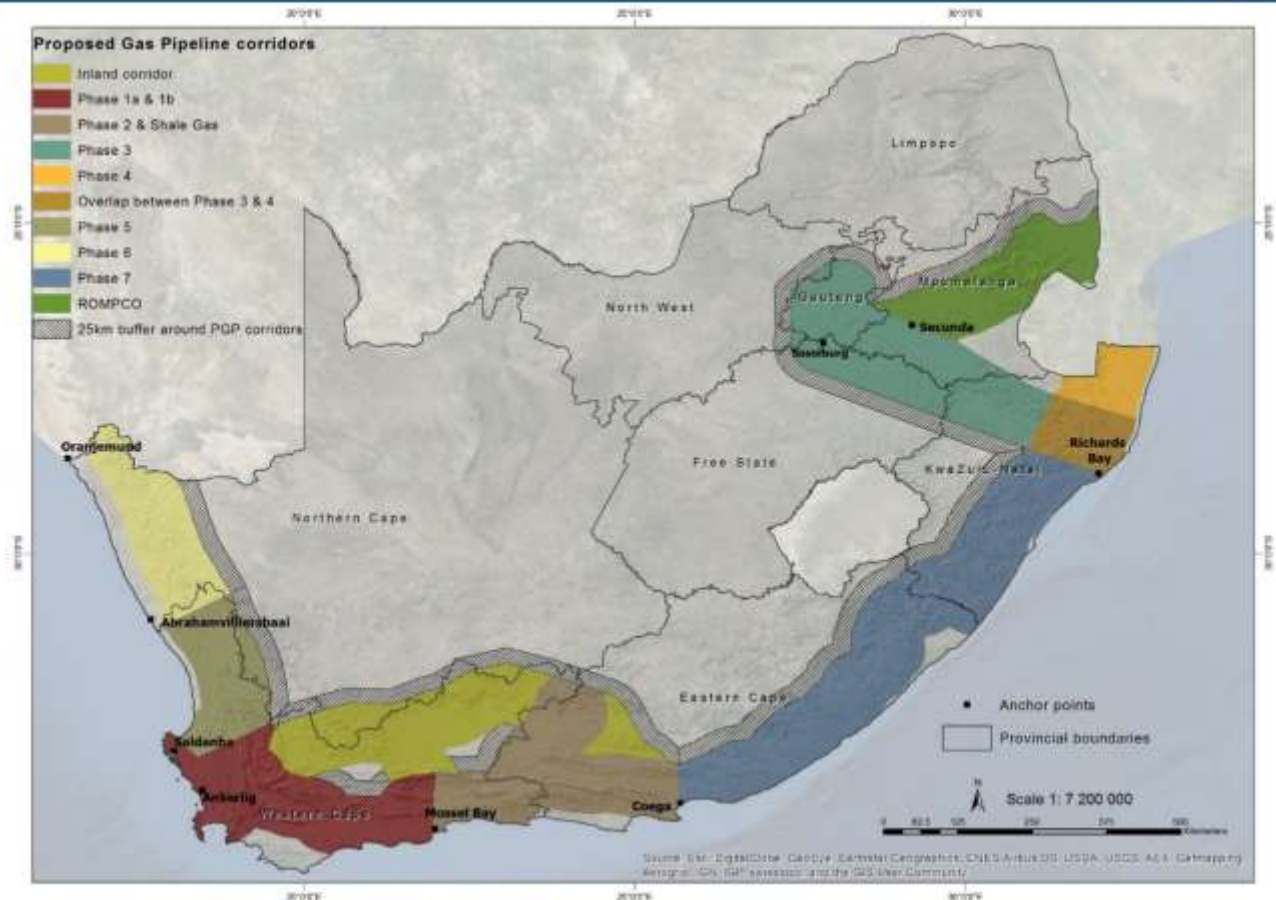
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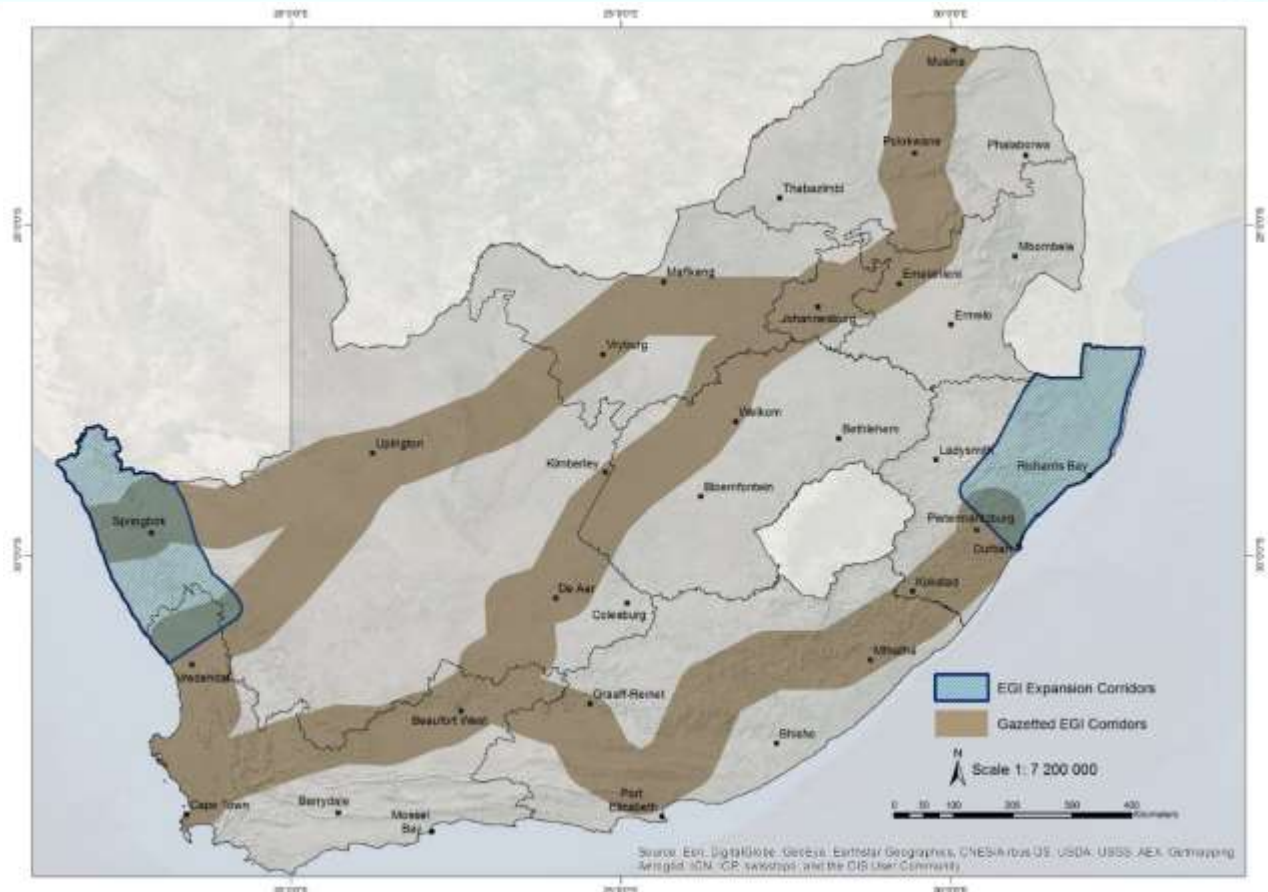
## Electricity Grid Infrastructure (EGI)



# Draft Phased Gas Pipeline Corridors



# Draft EGI Expansion Corridors





# KEY FINDINGS – DRAFT SPECIALIST STUDIES

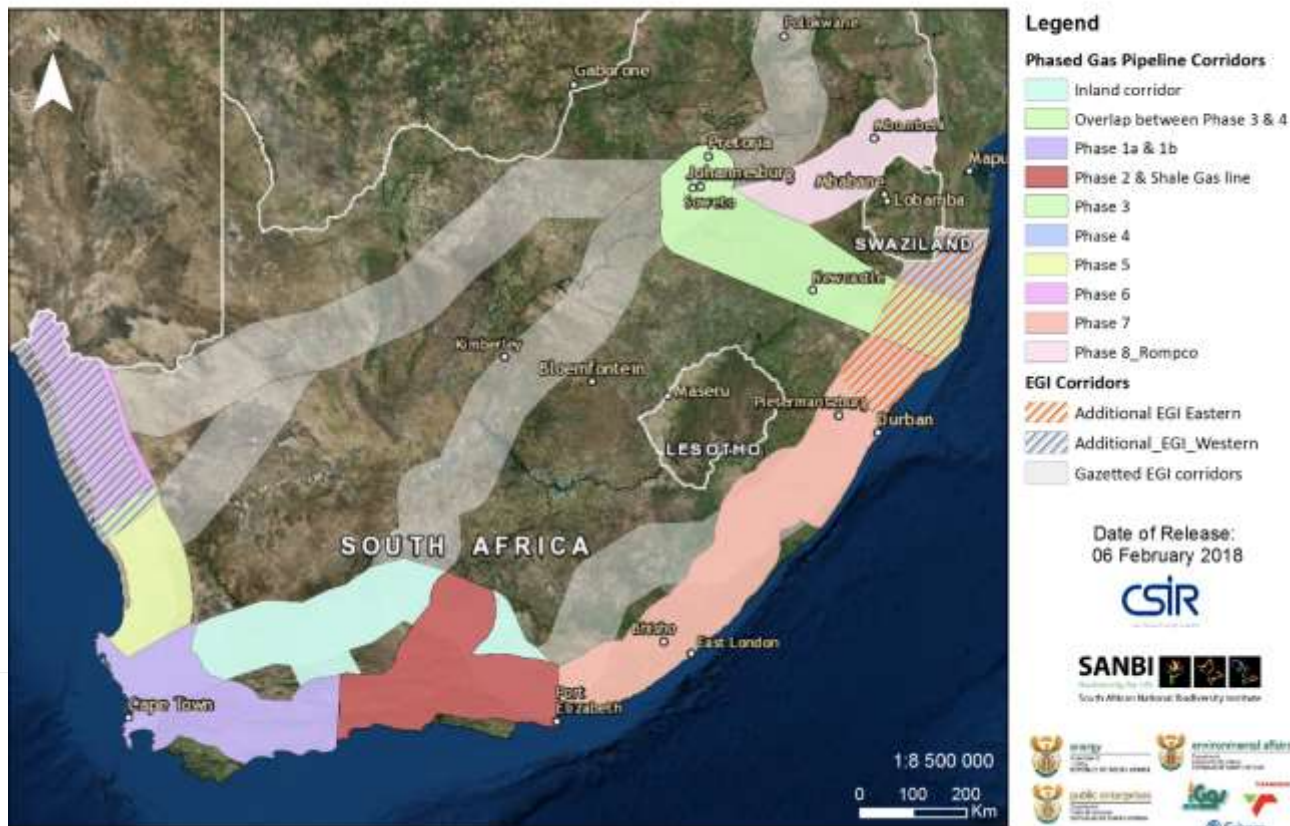
# Specialist Studies

<b>Biodiversity and Ecological Impacts (Terrestrial and Aquatic Ecosystems, Flora and Fauna)</b>	<b>Socio-Economic and Planning Assessment</b>	<b>Seismicity</b>
<p><b><u>Terrestrial:</u></b></p> <ul style="list-style-type: none"> <li>• Fynbos Biome</li> <li>• Savannah and Grassland Biomes</li> <li>• Indian Ocean Coastal Belt Biome</li> <li>• Albany Thicket Biome</li> <li>• Succulent and Nama Karoo Biomes</li> </ul> <p><b><u>Aquatic:</u></b></p> <ul style="list-style-type: none"> <li>• Estuaries</li> <li>• Rivers and Wetlands</li> </ul>	<p><b><u>Gas Pipeline Network</u></b></p> <ul style="list-style-type: none"> <li>• Benefits and Opportunities of Gas</li> <li>• Regional and Settlement Planning</li> <li>• Governance and Disaster Management</li> </ul> <p><b><u>EGI Expansion</u></b></p> <ul style="list-style-type: none"> <li>• Socio-Economic Impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Earthquakes and Faults</li> </ul>
<b>Bats</b>	<b>Avifauna</b>	<b>Visual (EGI only)</b>

Note: A Soils and Agricultural specialist is also appointed to provide inputs to the sensitivity mapping, EMPr and Protocols for the agricultural land component.

# Study areas

## National Strategic Environmental Assessment for a Gas network and EGI Expansion in South Africa





# Scientific assessment

- Scientific assessment = assimilation of existing knowledge
- Key questions the assessment aims to answer
  - Where are the most environmentally sensitive areas?
  - What are the impacts associated with the development?
  - What risks do the impacts associated with the development pose to the different sensitivity areas? *[Gas pipeline only]*
  - How can the impacts be mitigated?
  - How does mitigation change the risk profile? *[Gas pipeline only]*
  - What types of environmental assessment needs to be conducted in the sensitivity areas?
    - Which areas would be less / more onerous from an environmental assessment perspective for the developer?
    - Which areas, if proposed by developers, need additional / careful consideration?

# Assessment report layout

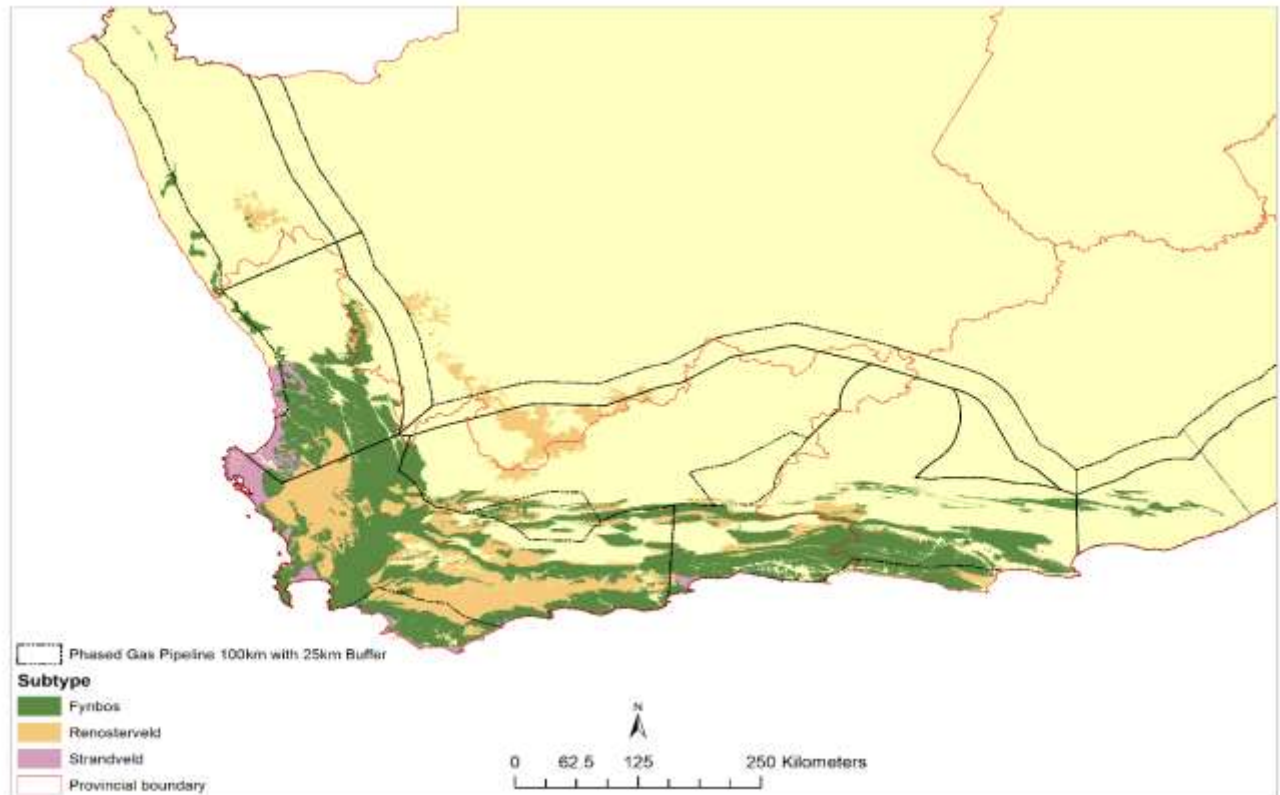
1. Introduction
2. Scope of the strategic issue
3. Approach and methodology (incl. data sources; assumptions & limitations)
4. Key environmental attributes of the study area (incl. feature maps)
5. Sensitivity analysis (incl. sensitivity maps)
6. Key impacts and mitigation
7. Best practice guidelines and monitoring requirements
8. Risk assessment [*Gas Pipeline only*]
9. Gaps in knowledge

# Sensitivity analysis

Sensitivity class	Features (Terrestrial)	Features (Aquatic)	Avifauna	Bats	Estuaries
Very high	National Protected Areas		Nest sites, roots and colonies of Red Data species	Limestone & dolomite geology	Estuaries in NPAs
	Critical Biodiversity Area (CBA1)		Cape Vulture colonies and vulture restaurants	Bat roosts	Estuaries of biodiversity importance
	Threatened species			Indigenous forest habitat	Important nurseries/estuarine habitats Natural or near natural condition estuaries
	-	Rivers & wetlands			
High	CBA2	-	IBAs Forests, Woodland & Grassland habitat	Arenite geology	Other estuaries Coastal rivers, wetlands and seeps above or adjacent to estuaries
	Mountain Catchments	-		Plantation habitat	
Medium	NPA Expansion Focus Areas	-	Other avifauna habitat	Sedimentary & extrusive rock	Coastal rivers, wetlands and seeps
	Ecological Support Area (ESA)			Thicket habitat	-
				Irrigated agriculture	-
Low	Least threatened vegetation	-	-	-	Terrestrial environment
	Modified landscapes				

## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - FYNBOS BIOME



## 6. Key findings from the draft assessment

### **TERRESTRIAL ECOLOGY - FYNBOS BIOME**

#### ➤ **Environmental attributes**

- Extremely diverse & high level of endemism
- Fire-dependant ecosystem
- Highly susceptible to alien invasion
- Restoration is difficult, especially in low rainfall areas

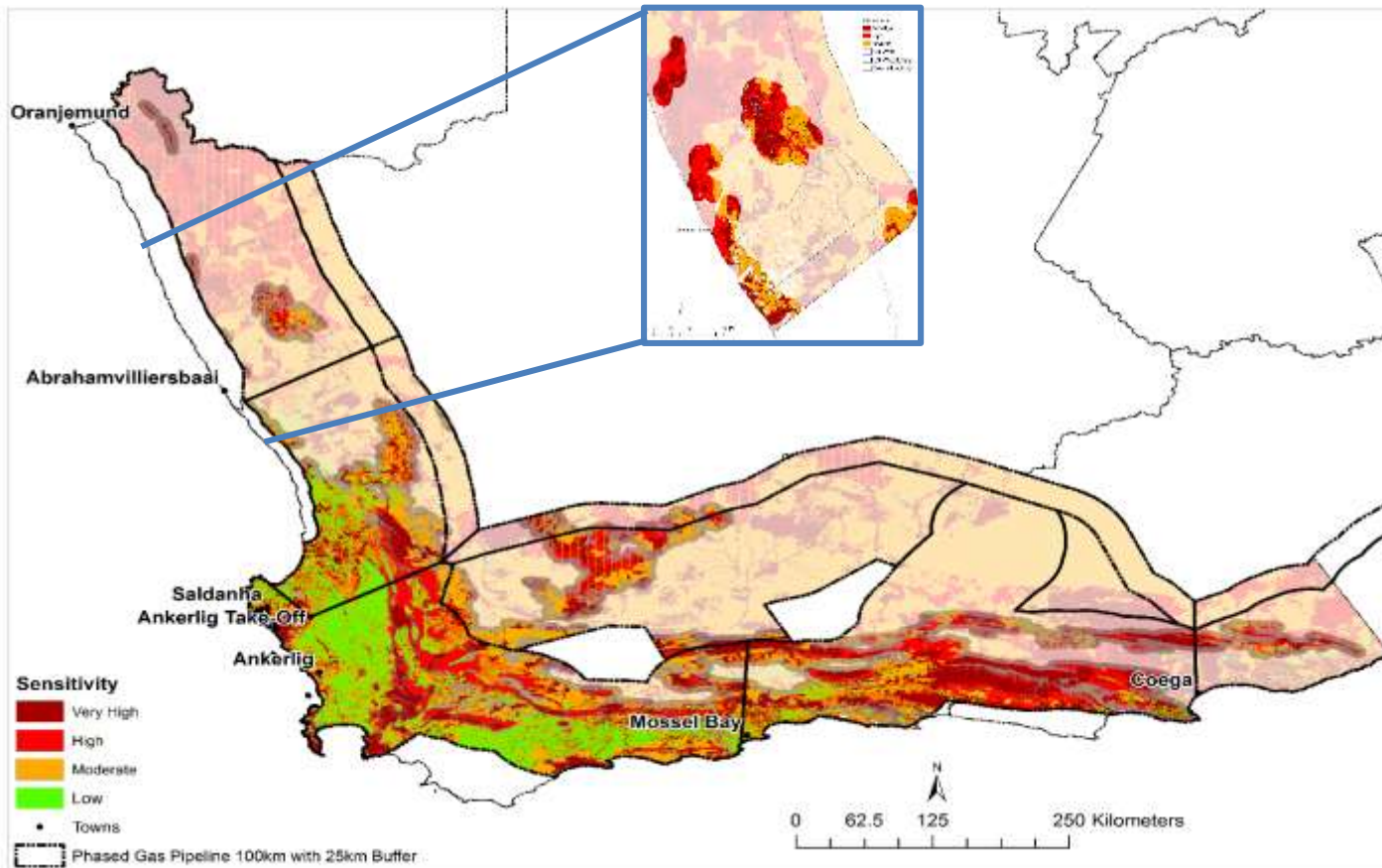
#### ➤ **Gaps in knowledge**

- Limited info on fynbos root systems, some can be 2-3 m
- Rehabilitation success in drier areas



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - FYNBOS BIOME





## 6. Key findings from the draft assessment

# **TERRESTRIAL ECOLOGY – KAROO & SUCCULENT BIOME**

### ➤ **Environmental attributes**

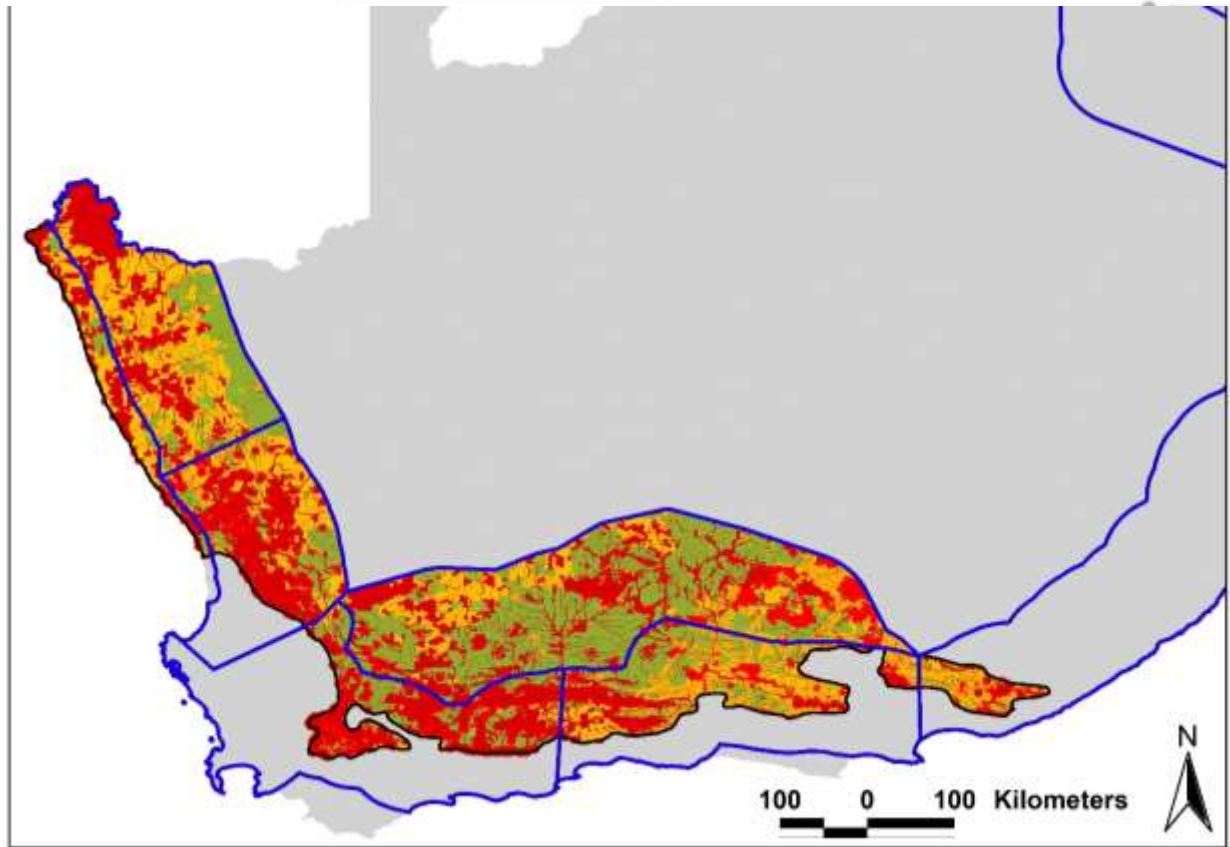
- Succulent Karoo:
  - Mostly flat and arid landscape
  - Unique vegetation (e.g. vygies)
- Nama Karoo
  - Low-growing karoo bossies
  - Alien plant invasions (e.g. prickly pear)
- Ephemeral dynamics (e.g. after rainfall)
- Koppies and rocky outcrops are most diverse
- Susceptible to erosion

### ➤ **Gaps in knowledge**

- Ecological requirements of species & cascading effects on processes

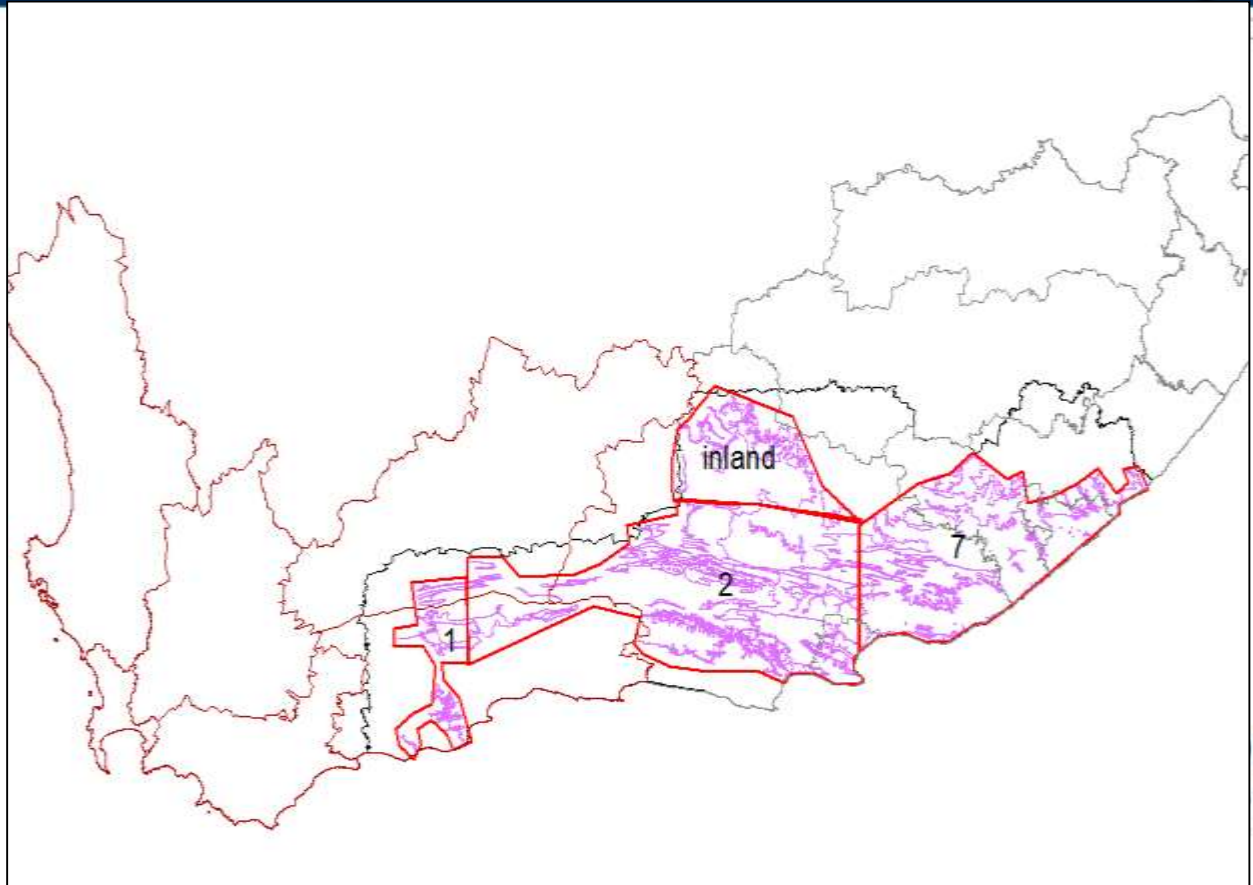
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### TERRESTRIAL ECOLOGY – KAROO & SUCCULENT BIOME



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - ALBANY THICKET BIOME



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - ALBANY THICKET BIOME

#### ➤ Environmental attributes

- High diversity and endemism for succulents
- Highly fragmented biome, nested in a mosaic of other biomes
- Extensively degraded due to overgrazing (e.g. goats)
- Invasion of non-thicket species (e.g. Grassland and Nama-Karoo elements)

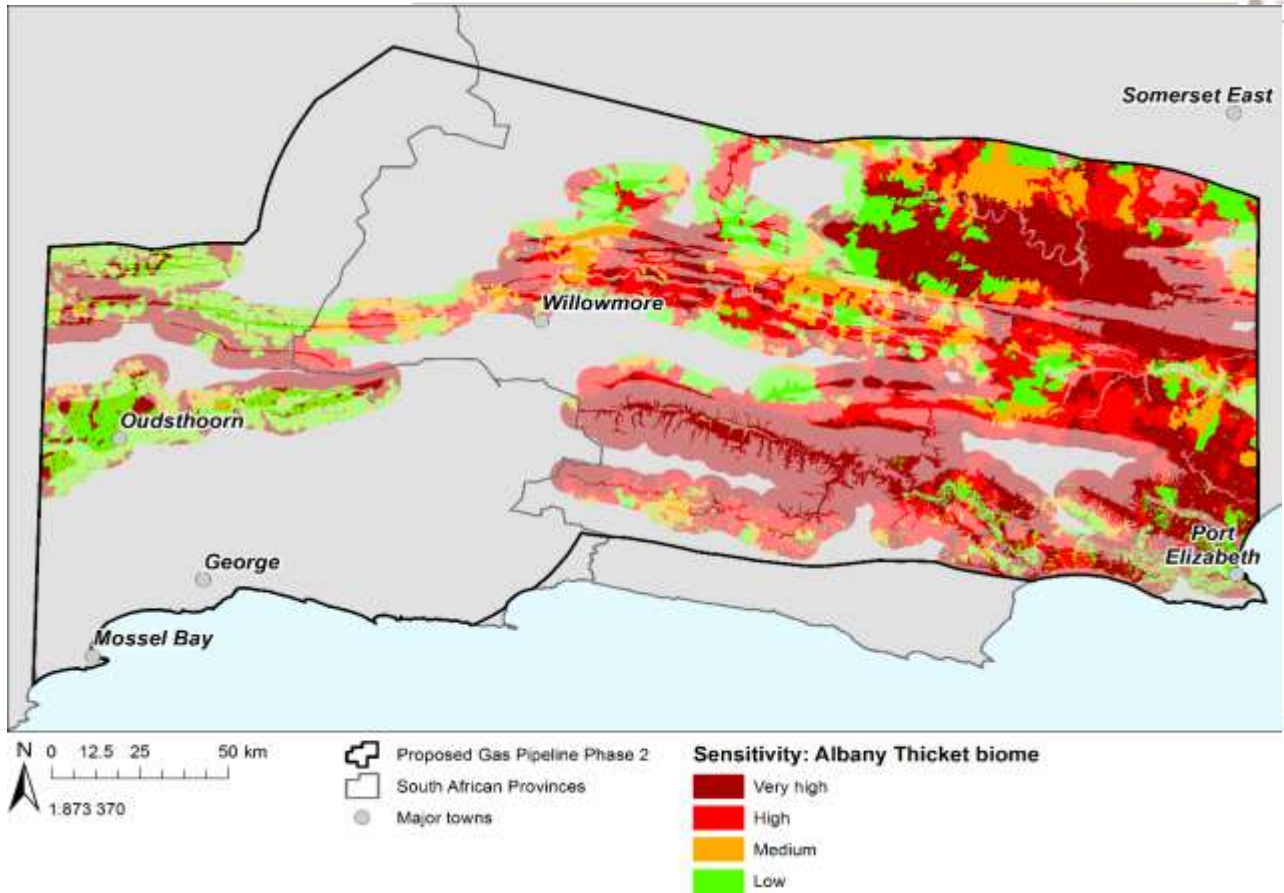


#### ➤ Gaps in knowledge

- Rehabilitation techniques
- Extent, stability and distribution of rare & threatened thicket fauna and flora

## 6. Key findings from the draft assessment

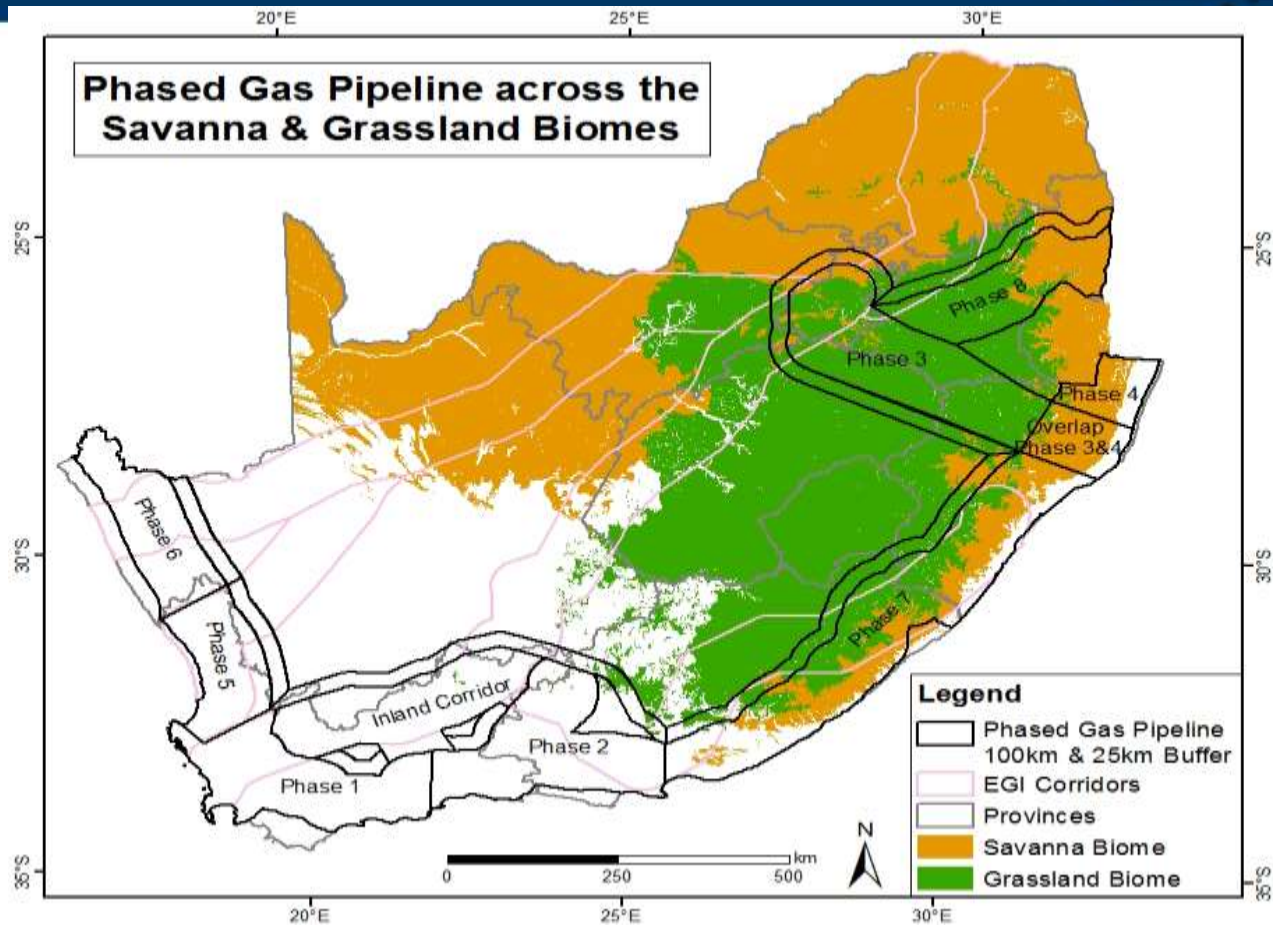
### TERRESTRIAL ECOLOGY - ALBANY THICKET BIOME





## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - GRASSLAND/SAVANNA BIOME





## 6. Key findings from the draft assessment

### **TERRESTRIAL ECOLOGY - SAVANNA BIOME**

#### ➤ **Environmental attributes**

- Woody tree layer
- Generally resilient to small-scale impacts
- Fire-dependant ecosystem
- Tree layer difficult to re-establish after complete clearance

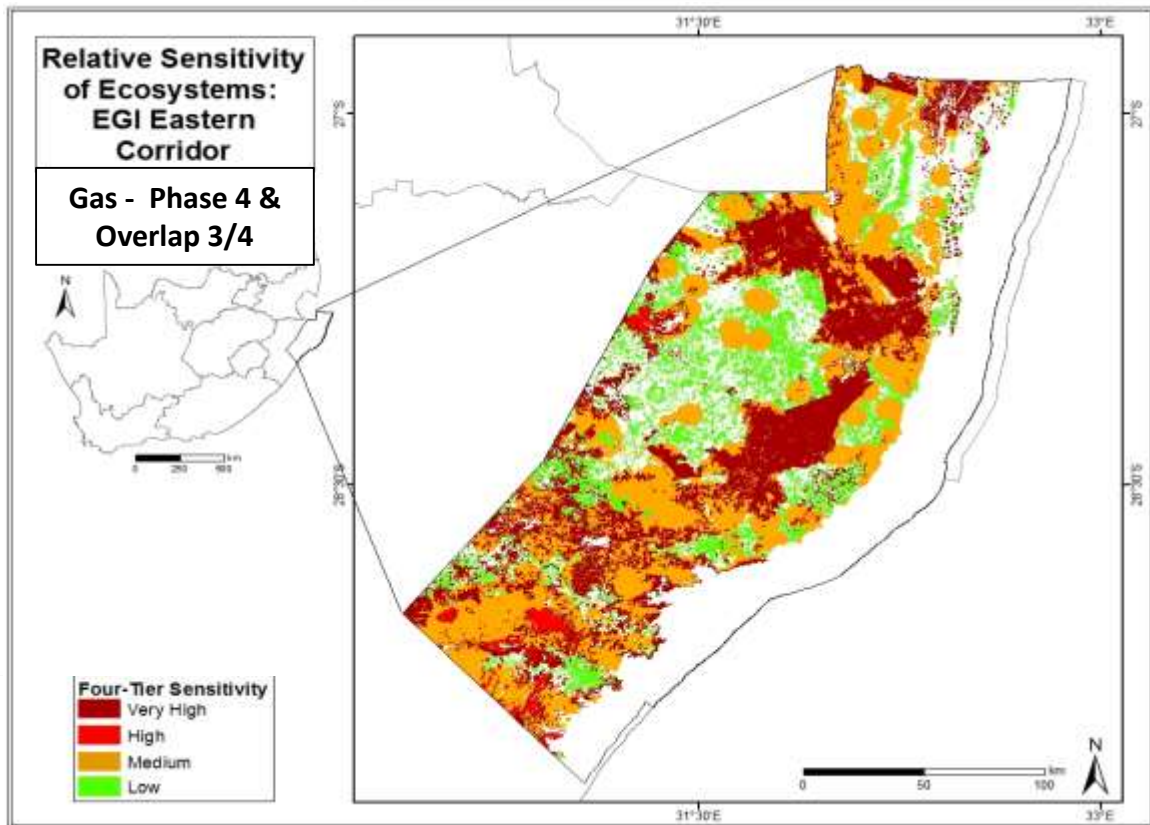
#### ➤ **Gaps in knowledge**

- Location of specific sites with rare and threatened species



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - SAVANNA BIOME



## 6. Key findings from the draft assessment

### **TERRESTRIAL ECOLOGY - GRASSLAND BIOME**

#### ➤ **Environmental attributes**

- Dominant grass layer, but high diversity of rare non-grass herbaceous species.
- Extensively transformed due to agriculture, mining and urban development
- Not well conserved

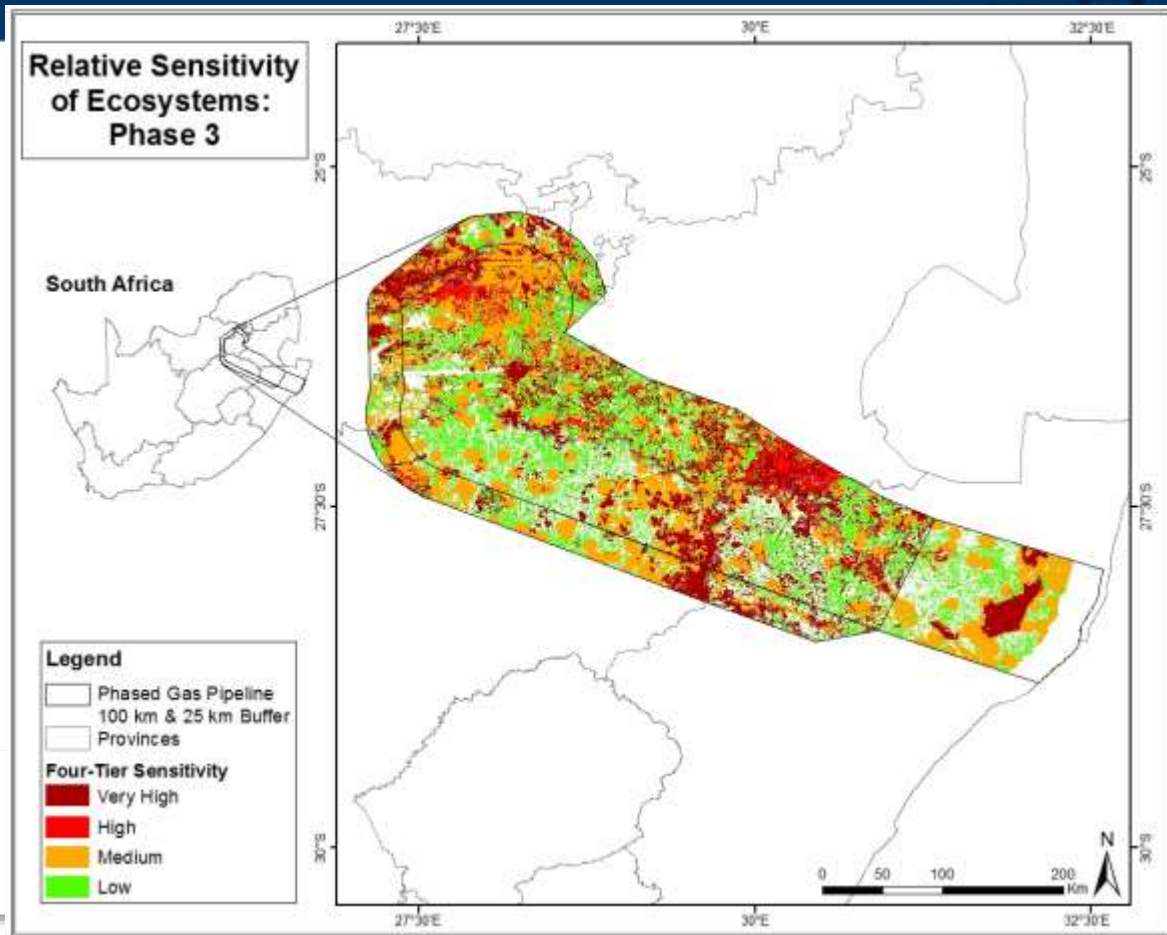
#### ➤ **Gaps in knowledge**

- Location of specific sites with rare and threatened species



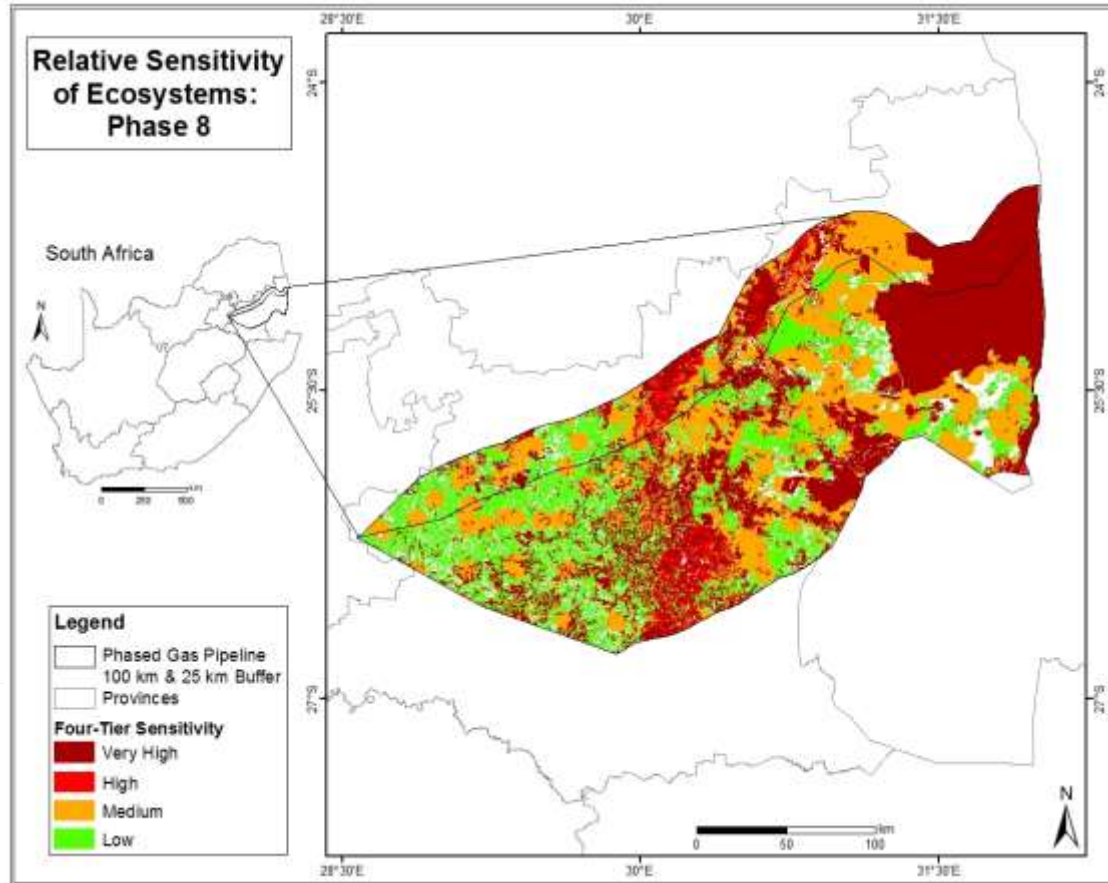
## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - GRASSLAND BIOME



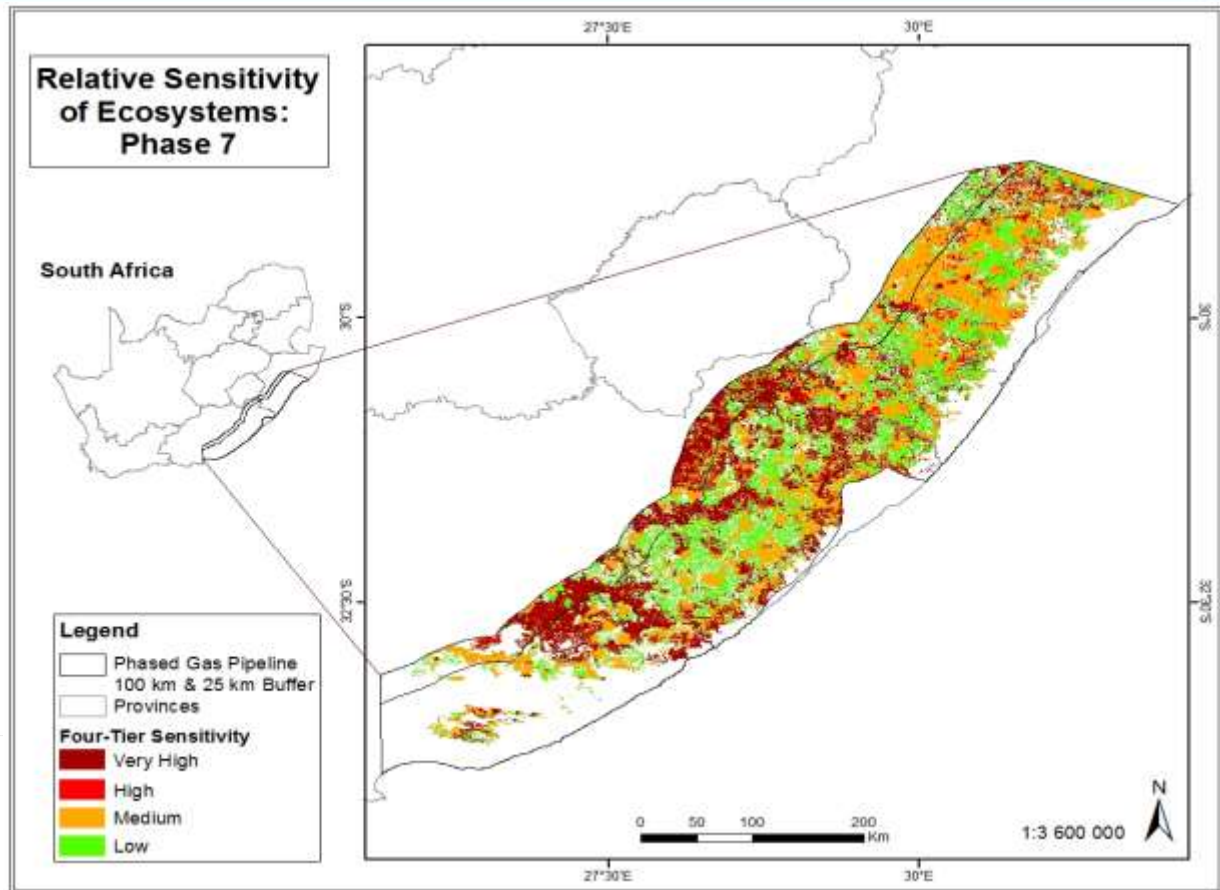
## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - GRASSLAND/SAVANNA BIOME



## 6. Key findings from the draft assessment

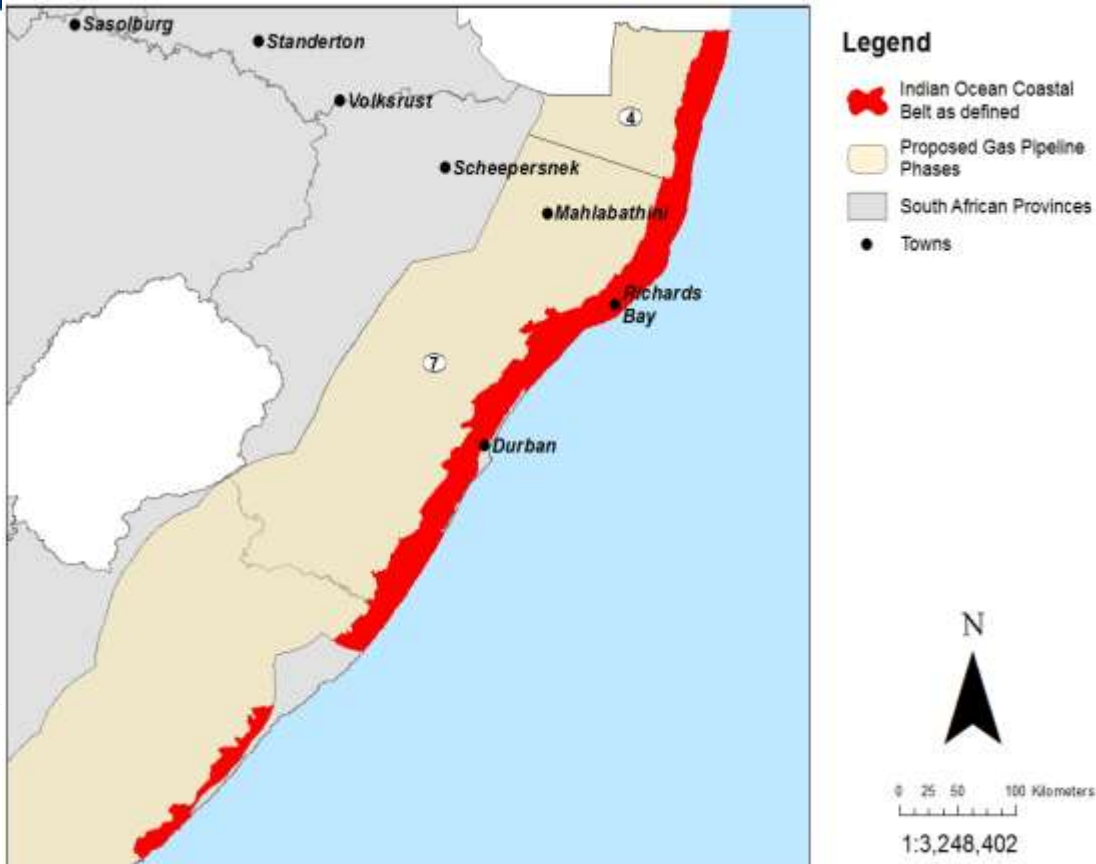
### TERRESTRIAL ECOLOGY - GRASSLAND/SAVANNA BIOME





# 6. Key findings from the draft assessment

## TERRESTRIAL ECOLOGY - INDIAN OCEAN COASTAL BELT BIOME



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - INDIAN OCEAN COASTAL BELT BIOME

#### ➤ Environmental attributes

- Grassy coastal plains to undulating hills with shrubs, trees and forest
- Extensively transformed outside of protected areas due to sugar cane cultivation, timber plantations and urban development

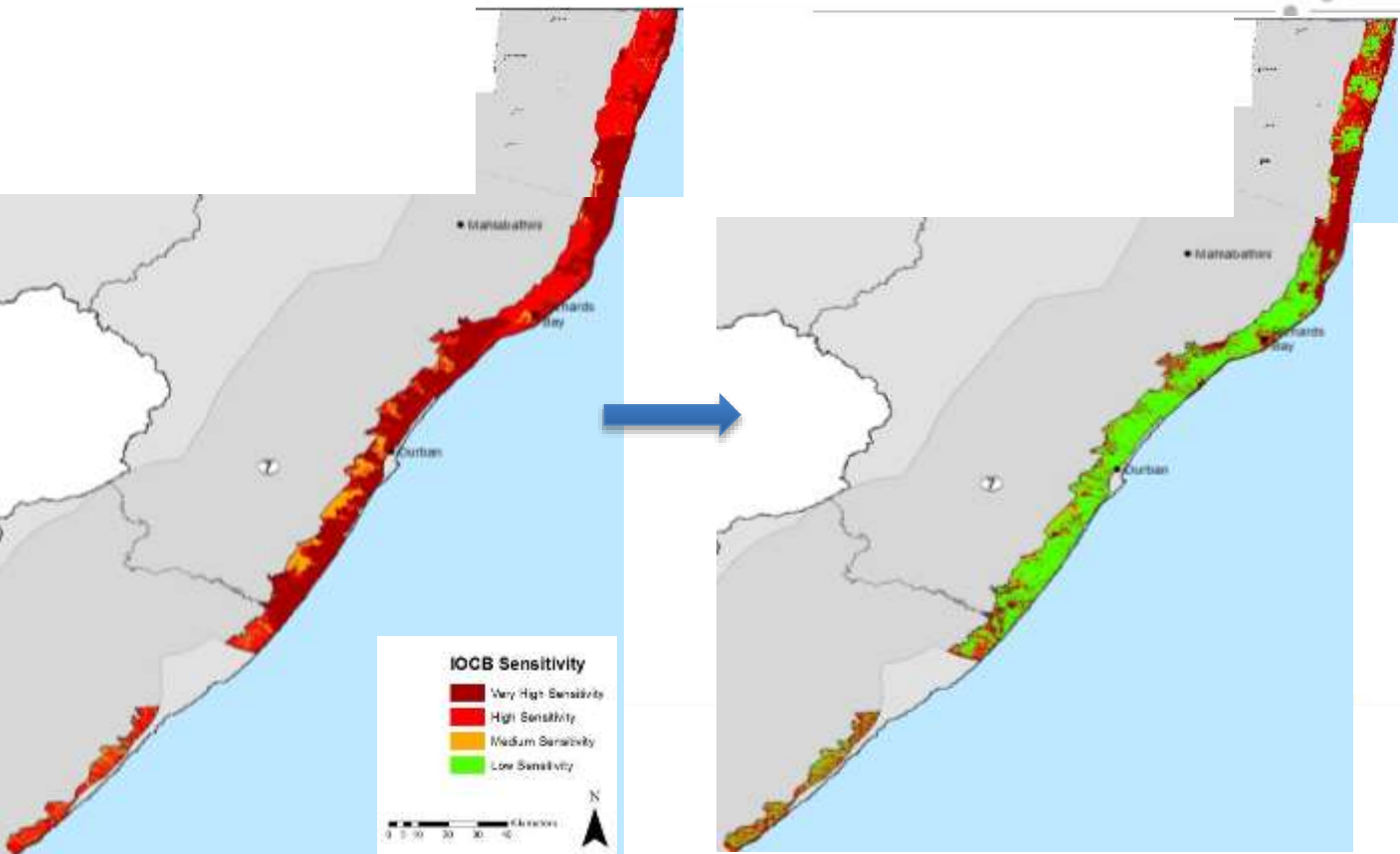
#### ➤ Gaps in knowledge

- Faunal records mainly limited conservation areas



## 6. Key findings from the draft assessment

### TERRESTRIAL ECOLOGY - INDIAN OCEAN COASTAL BELT BIOME



## 6. Key findings from the draft assessment

### **TERRESTRIAL ECOLOGY – KEY IMPACTS AND MITIGATION**

#### ➤ **Key impacts**

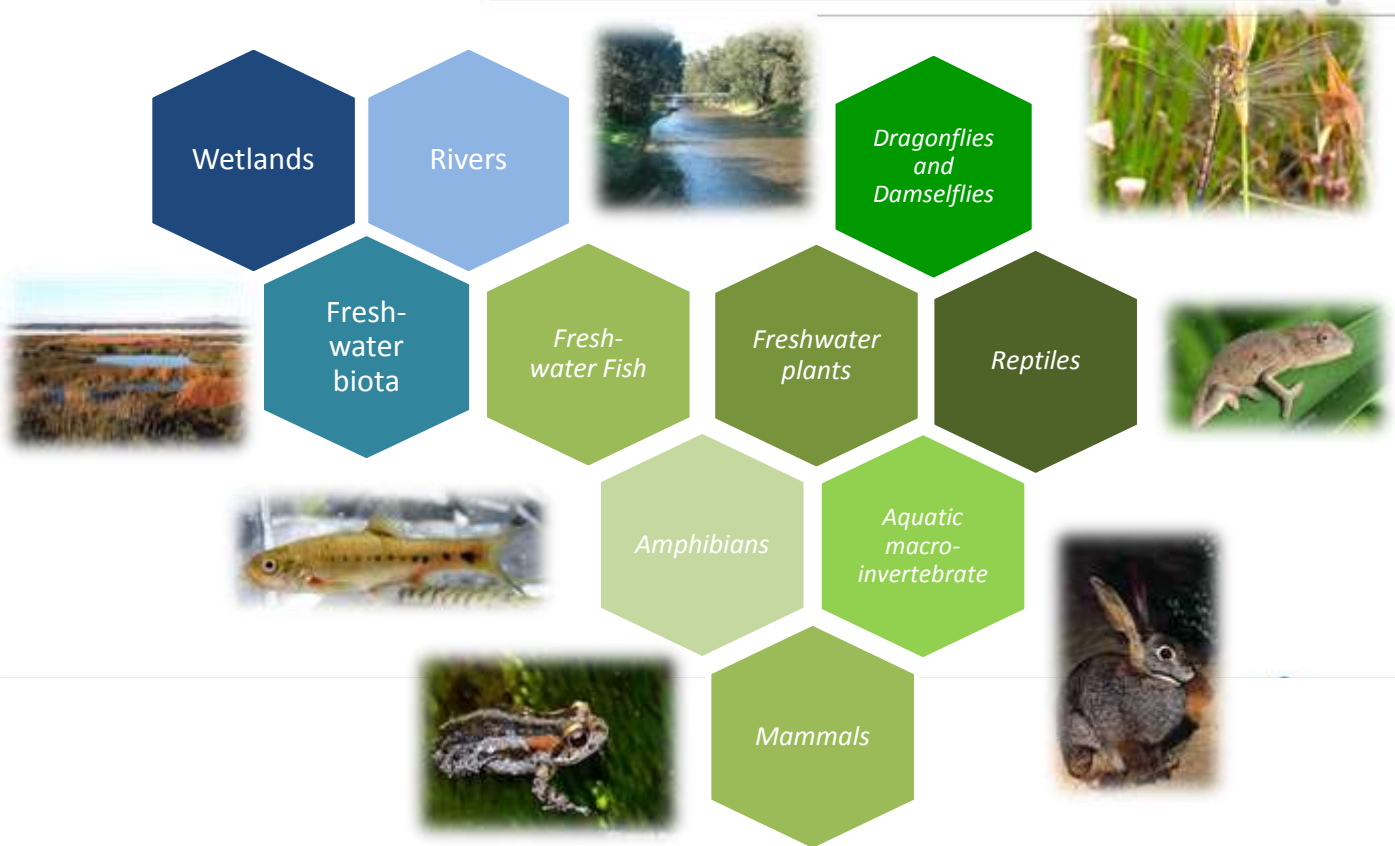
- Introduction and establishment of alien species
- Loss of rare / endemic species
- Changes in habitat structure and function
- Erosion and nuisance (e.g. dust, noise)
- Movement of terrestrial fauna

#### ➤ **Management & mitigation**

- Avoid Very high/high sensitivity areas (e.g. NPAs, CBAs)
- Limit activity footprint
- Monitor species composition and invasion of alien species
- Monitor soil erosion
- Seasonal considerations for disturbance and rehabilitation

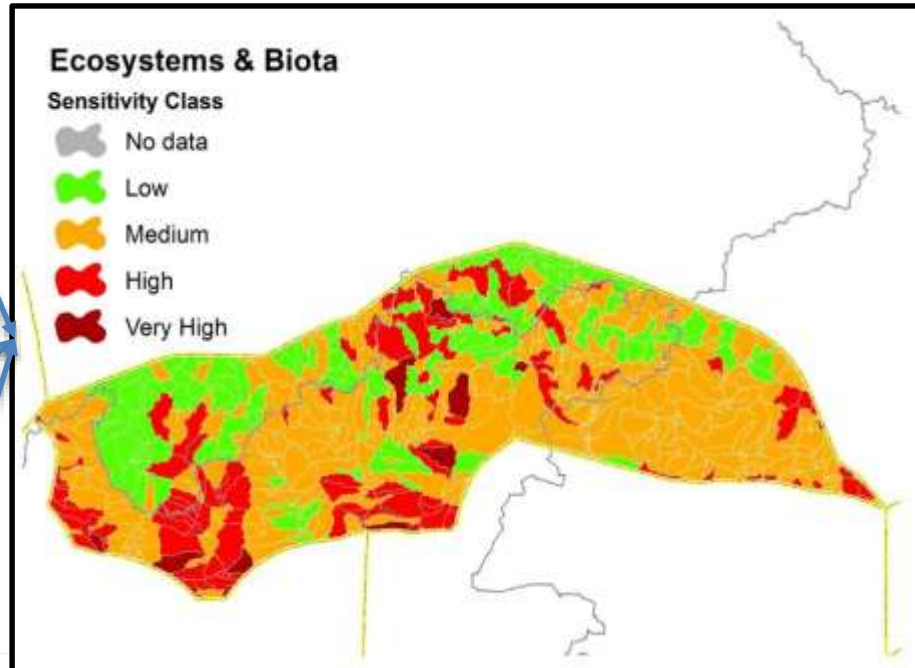
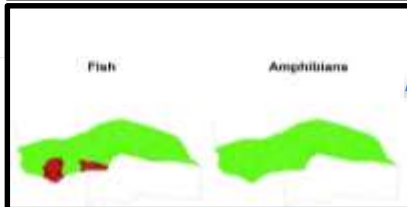
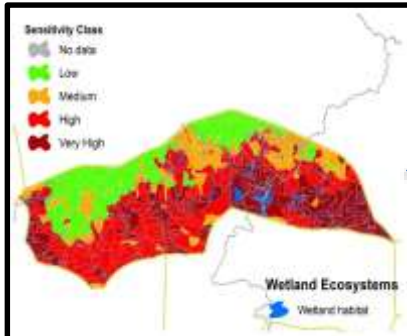
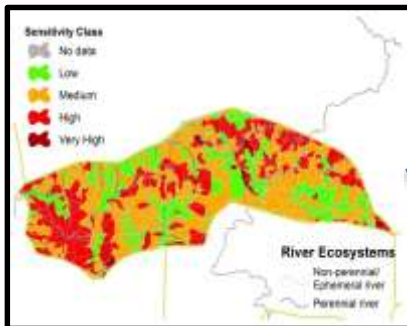
## 7. Key findings from the draft assessment

### AQUATIC ECOLOGY - FRESHWATER



# 7. Key findings from the draft assessment

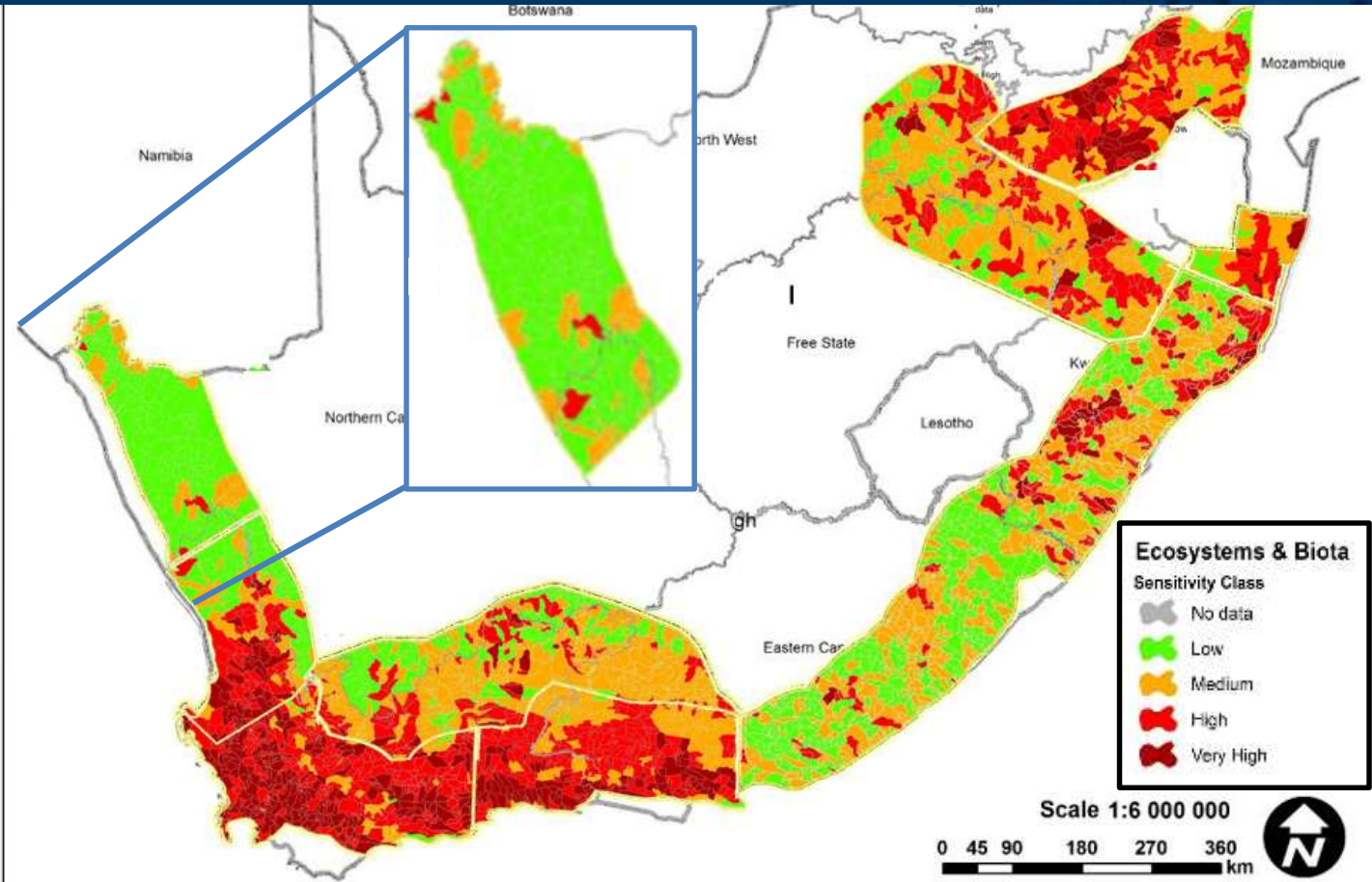
## AQUATIC ECOLOGY - FRESHWATER





## 7. Key findings from the draft assessment

### AQUATIC ECOLOGY - FRESHWATER



# 7. Key findings from the draft assessment

## AQUATIC ECOLOGY - FRESHWATER

### ➤ Key impacts

- Aquatic habitat loss and fragmentation
- Hydrological alteration
- Erosion and sedimentation
- Water quality deterioration
- Growth stimulation of alien vegetation/invasive species
- Disturbance to aquatic fauna



### ➤ Management & mitigation

- Avoid wetland, river & riparian habitat
- Reduce time of open & exposed trenches/excavations

### ➤ Gaps in knowledge

- Occurrence of threatened aquatic species is not extensively known

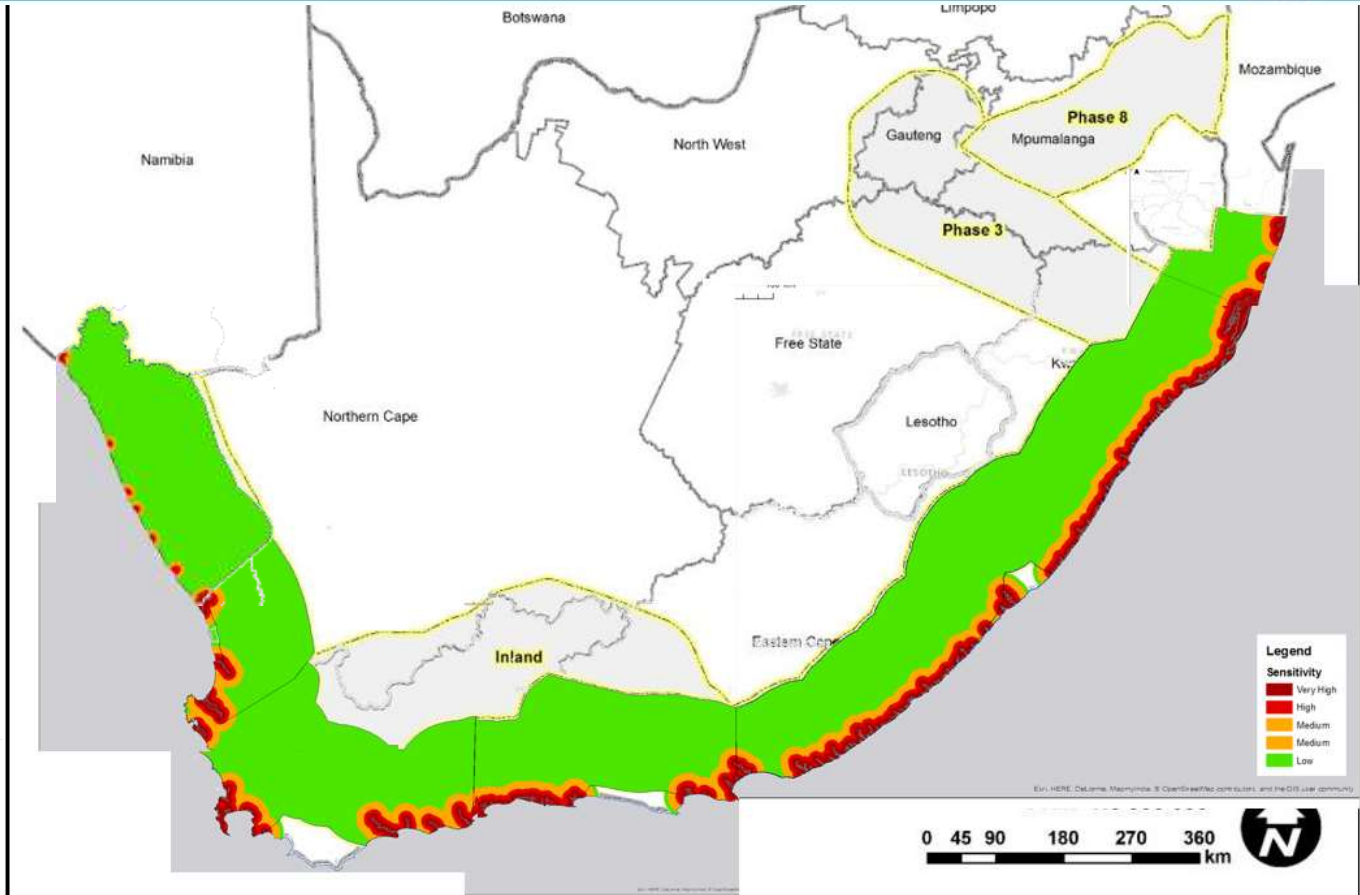
## 7. Key findings from the draft assessment

### AQUATIC ECOLOGY - ESTUARIES



## 7. Key findings from the draft assessment

### AQUATIC ECOLOGY - ESTUARIES



# 7. Key findings from the draft assessment

## AQUATIC ECOLOGY - ESTUARIES

### ➤ Environmental attributes

- Highly dynamic & sensitive systems

### ➤ Key impacts

- Habitat destruction
- Altered dynamics
- Water quality deterioration
- Loss of upper catchment-marine connectivity
- In-stream pipeline crossing trapping sediment and increasing flood risk

### ➤ Management & mitigation

- Avoid estuaries as far as possible
- Limit trenching, opt for HDD / pipe-jacking

### ➤ Gaps in knowledge

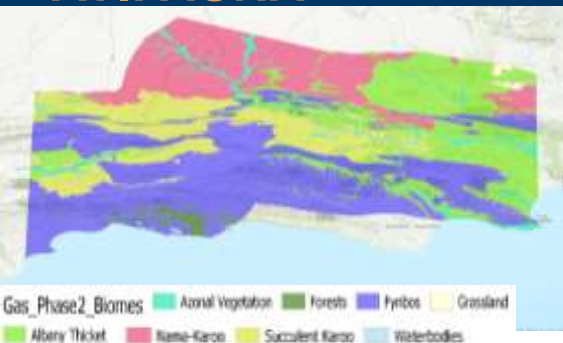
- Lack of data on physical processes e.g. Sedimentary dynamics, geology & hydrology (flooding potential)





# 8. Key findings from the draft assessment

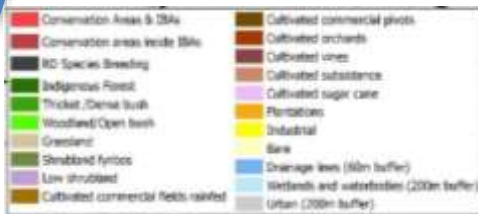
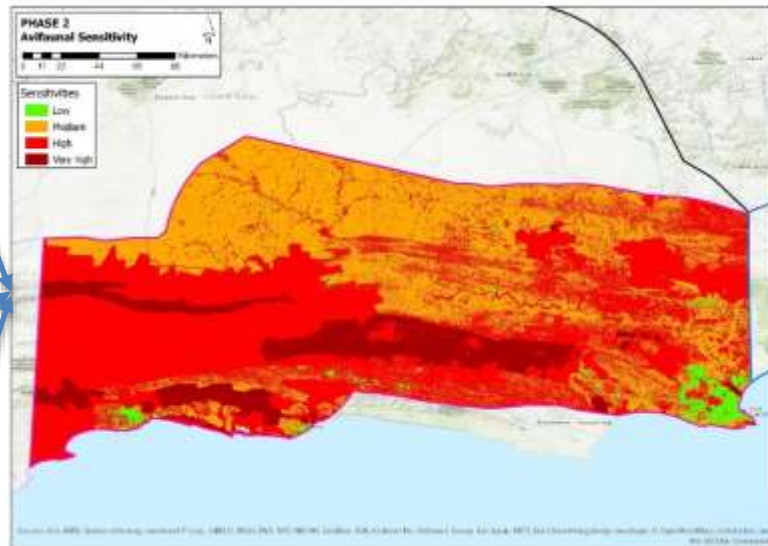
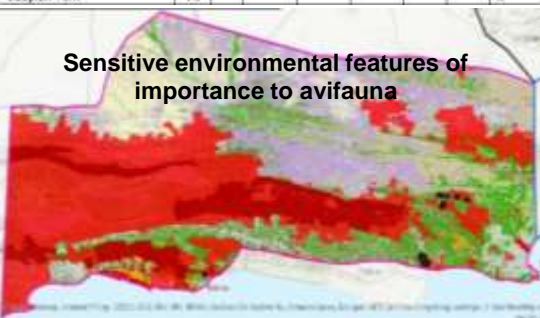
## AVIFAUNA



NT = Near threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered

Species	Status	Fynbos	Succulent Karoo	Nama Karoo	Albany Thicket	Grassland	Forest	Annual
African Marsh-Harrier	EN	x				x		x
Agulhas Long-billed Lark	NT	x						
Black Harrier	EN	x	x	x		x		
Black Stork	VU	x	x	x	x			x
Blue Crane	NT	x	x	x		x		x
Caspian Tern	VU							x

Sensitive environmental features of importance to avifauna





## 8. Key findings from the draft assessment

### AVIFAUNA

#### ➤ Key impacts

- Displacement due to disturbance & habitat transformation.
- Direct mortality due to the destruction of nests in the construction servitude
- Electrocution, Collision *[EGI only]*

#### ➤ Management & mitigation

- Avoid known sensitive bird habitat and flight paths
- Bird-friendly powerline design (incl. Bird Flight Diverters) *[EGI only]*

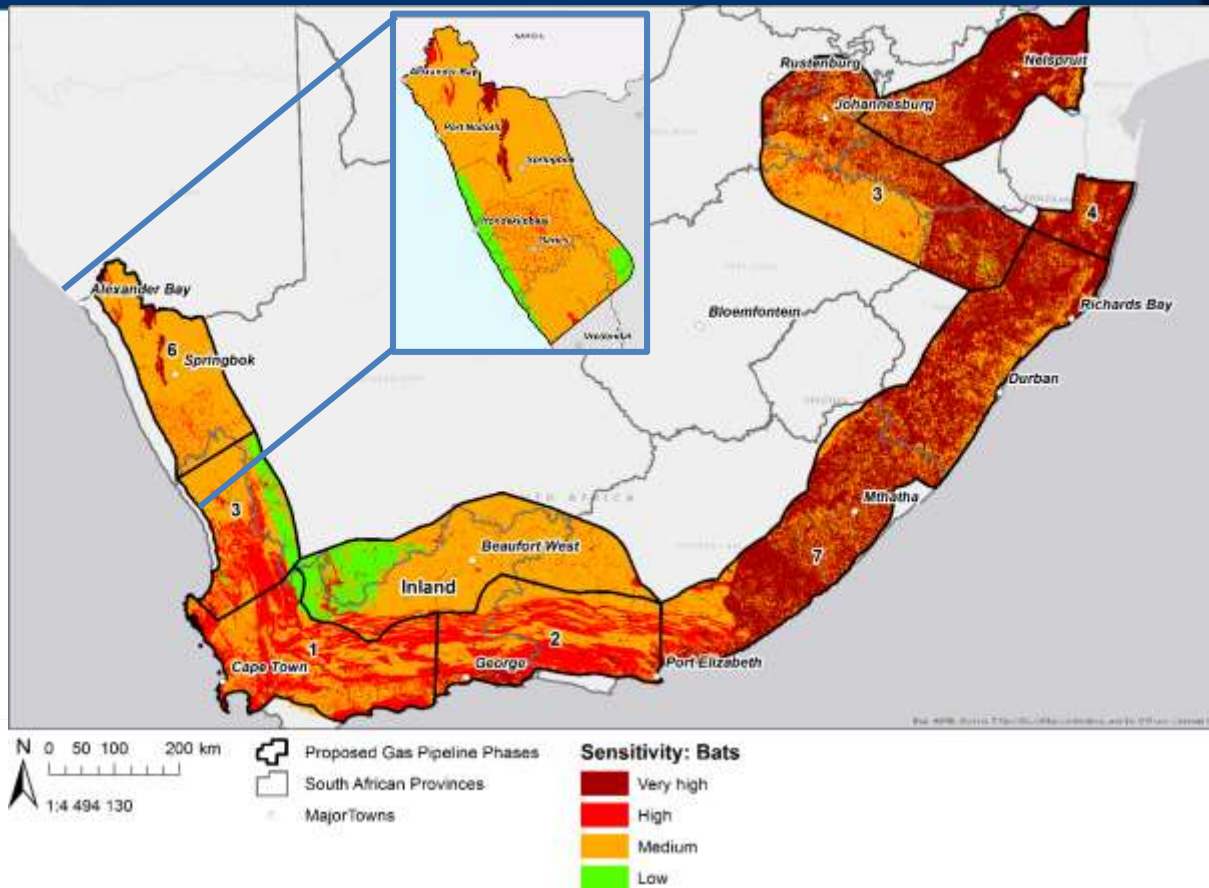
#### ➤ Gaps in knowledge

- Population sizes of many Red Data species are not well known



## 9. Key findings from the draft assessment

### BATS



# 9. Key findings from the draft assessment

## BATS

### ➤ Key impacts

- Displacement due to disturbance & habitat transformation
- Electrocutation [*EGI only*]
- Electromagnetic interference [*EGI only*]



### ➤ Management & mitigation

- Avoid key bat roosts or foraging habitat
- Avoid construction in certain seasons
- Minimise development footprint
- Prevent dust and sedimentation of water bodies

### ➤ Gaps in knowledge

- Effects of electromagnetic radiation on flying bats & the echolocation of insectivorous bats during foraging is unknown

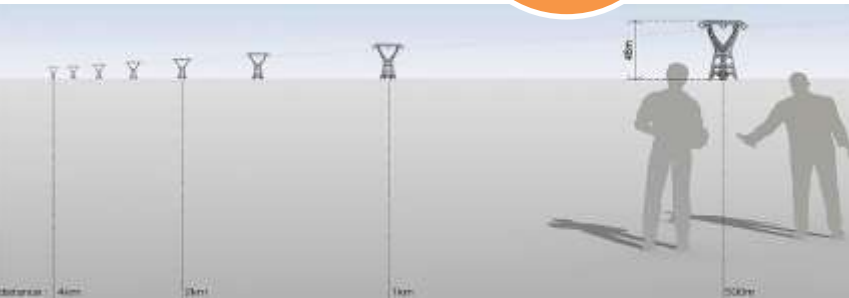
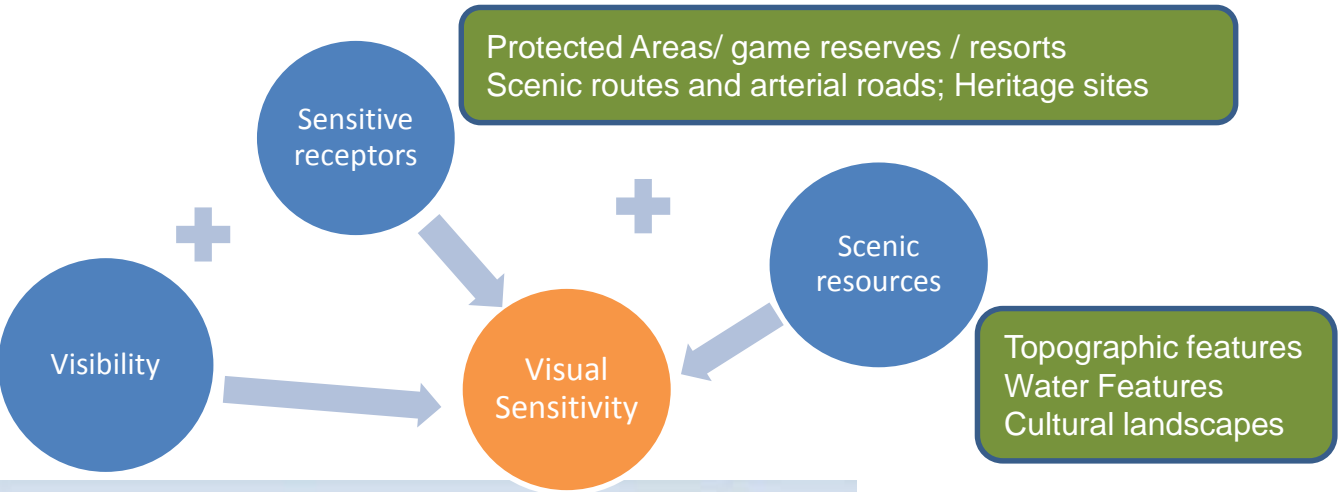
# Gaps in knowledge

1. Limited info on root systems
  - Fynbos biome
2. Rehabilitation success
  - Fynbos (drier areas) and Albany Thicket
3. Extent and distribution of species of special concern
  - Albany Thicket, Savanna, Grassland, IOCB (faunal records)
  - Freshwater systems
4. Population sizes of many Red Data species (birds)
5. Lack of data on physical processes (Estuaries)
6. Electromagnetic radiation flying bats; echolocation

# Key findings from draft assessment

## VISUAL IMPACT ASSESSMENT

- Identification of features of visual or scenic value, as well as sensitive receptors



**CSIR**

*Degree of visibility of pylons at a range of distances from the viewer.*

# Key findings from draft assessment

## VISUAL IMPACT ASSESSMENT



Map 88i • Expanded Western Corridor - Visual Sensitivity



Map 88ii • Expanded Eastern Corridor - Visual Sensitivity

### Western Expanded Corridor

- Moderate to good potential, in visual terms.
- Main pinch points - Namaqua National Park and Orange River

### Eastern Expanded Corridor

- Moderate potential in visual terms.
- Main pinch points – Complex topography (steep slopes), game reserves, Umfolozi World Heritage Site

## Overall Visual Sensitivity - EGI



# Key findings from draft assessment

## VISUAL IMPACT ASSESSMENT

### Conclusion:

- Opportunities do exist in both of the expanded corridors for the alignment of transmission lines, although a number of pinch-points need to be accounted for.
- The varied nature of the landscape in the two expanded EGI corridors, and widespread occurrence of scenic and heritage resources, will require careful micro-siting of powerlines and substations at the project level.
- Good housekeeping to be implemented during construction (dust suppression, rehabilitation, limit construction footprint, etc.)

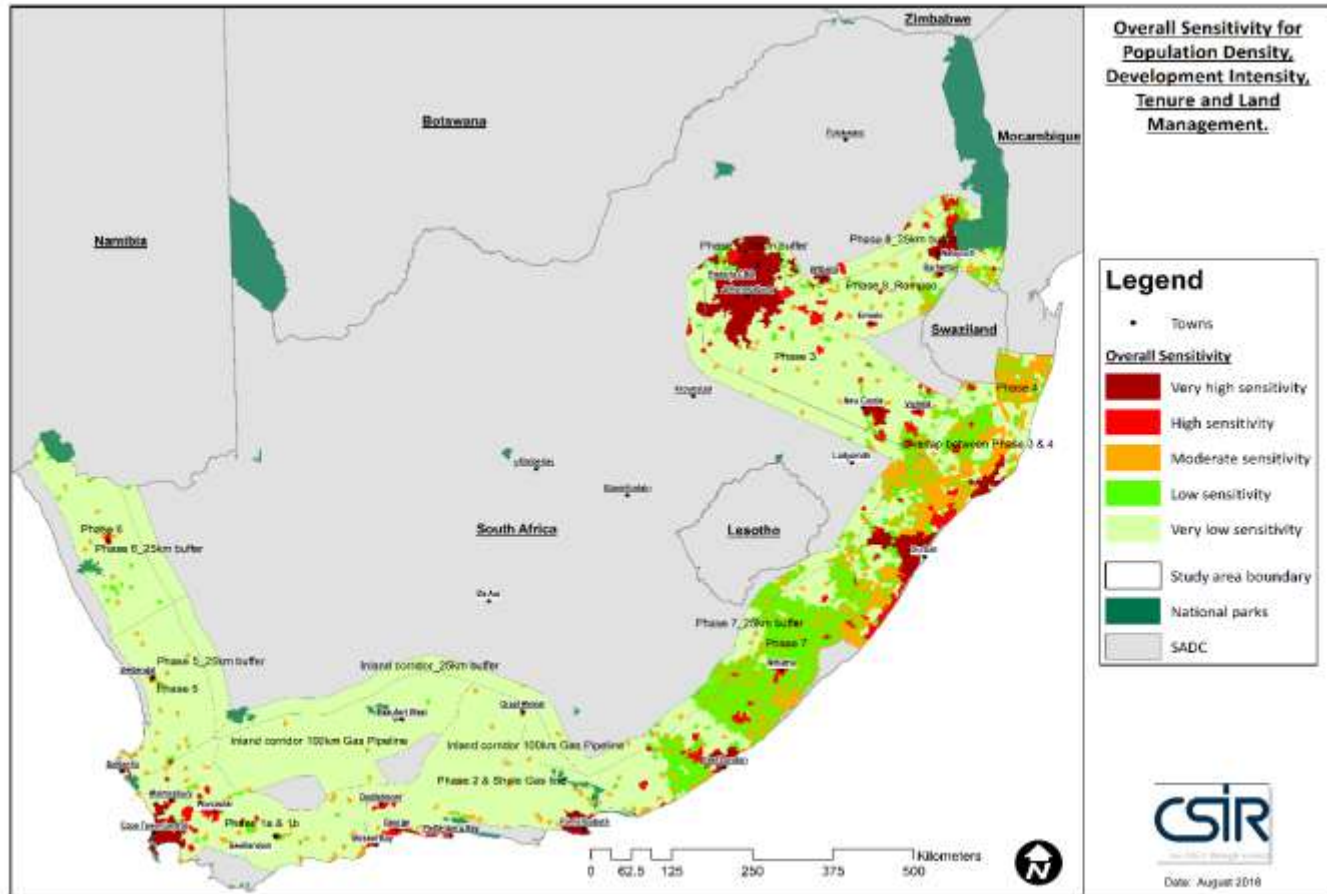
# Key findings from draft assessment – Gas Pipeline

## **SOCIAL, PLANNING, DISASTER MANAGEMENT**

### **Purpose:**

- To identify key settlement planning and development considerations
- To identify key impacts associated with the construction and operation of a gas pipeline on the communities livelihoods
- To outline the various agencies that have to be involved in disaster management as part of the pipeline operations.

## Key findings from draft assessment – Gas Pipeline SOCIAL, PLANNING, DISASTER MANAGEMENT



# Key findings from draft assessment – Gas Pipeline

## SOCIAL AND SETTLEMENT PLANNING

- Complexity of land-use management and tenure implications (land negotiations, servitude proclamation)
  - Extent of land parcels and stakeholders potentially affected
  - Ensure extensive community participation
- Resettlement and relocation/ displacement impacts - unlikely
- Impact on the location options of new developments (extent and direction) due to the presence of the gas pipeline and limit potential economic growth
  - Developer must check growth direction of nearby settlements
  - Check existing and approved development applications and land use rights.

# Key findings from draft assessment – Gas Pipeline

## SOCIAL AND SETTLEMENT PLANNING

- Disruption of population livelihoods due to construction activities as well as impacts on service delivery and local economies during construction
  - Considered low – construction outside town, cities and other areas of high population densities
  - Likely temporary local employment of unskilled labour/Limited long term employment opportunities
- Impacts on local population due to the presence and movement of project workers/workforce and influx of job seekers
  - Disruption of structures and social networks, specifically in rural areas

# Key findings from draft assessment – Gas Pipeline

## SOCIAL AND SETTLEMENT PLANNING

- Health Risks associated with a gas pipeline leak, rupture or fire
  - Unintended pipeline strikes due to intensity of underground infrastructure lines
  - Inaccessibility of plans
  - Encroachment of suburban growth upon pipelines designed for rural areas
- Preparedness in responding to a disaster - Need adequate disaster management planning to ensure that a pipeline incident does not escalate into a disaster.
  - The key overall strategy involves developing a working partnership between Government (at various levels) and the Developer
  - In partnership with the provincial governments, the Developer must draft a set of interventions to build municipal Disaster Management capacity/training
  - Requires ongoing public awareness and involvement/training.



# Key findings from draft assessment - EGI

## SOCIO-ECONOMIC IMPACTS

- Impacts on key economic sectors including:
  - Impacts on electricity generators
  - Impacts on energy intensive users
  - Impacts on tourism (including eco-tourism)
- Impacts on property values
- Resettlement and relocation/displacement impacts
- Impacts associated with project workers/workforce
- Health impacts focused on electro-magnetic fields (EMFs)

# Key findings from draft assessment

## SEISMICITY ASSESSMENT

Earthquakes driven by geological forces (e.g. motion of tectonic plates, isostatic response to erosion, volcanism) or certain human activities (e.g. mining, impoundment of reservoirs, fluid injection or extraction).

Seismic hazard in South Africa is generally low by world standards. Eight damaging earthquakes ( $5.0 < M < 6.3$ ) have occurred in South Africa during the last 120 years.

Typical of MMI 6 = shaking is strong enough to cause alarm but only cause minor damage to buildings and well below the damage thresholds of modern EGI.

Larger tectonic earthquakes (say  $6.5 < M < 8$ ) are rare in stable regions.

Typical of MMI 8 = shaking is strong enough to cause slight damage to earthquake-resistant structures, considerable damage to solid buildings, and great damage to poorly-built buildings.

# Key findings from draft assessment

## SEISMICITY ASSESSMENT

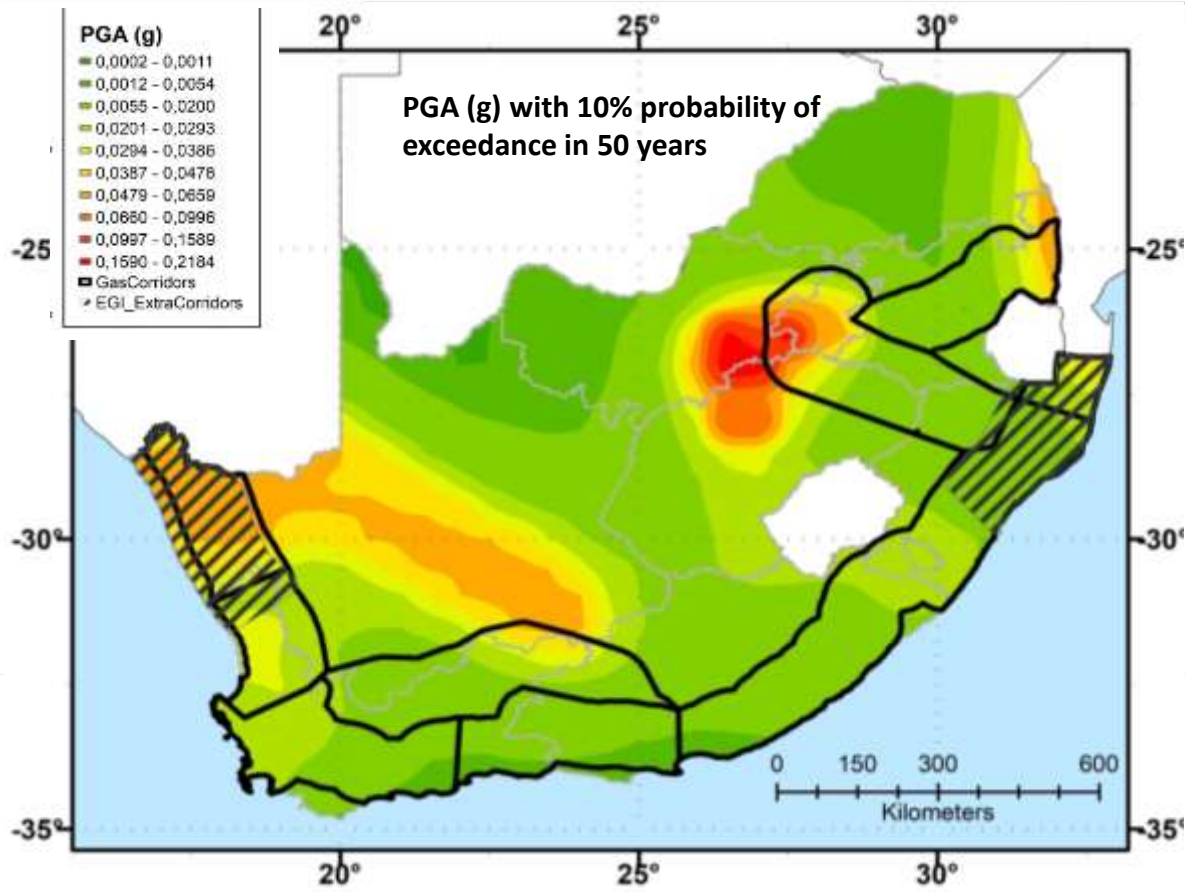
- Earthquake causes (direct impacts):
  - the ground, EGI and Gas Pipelines to shake to such an extent that damage occurs; or
  - displacement between opposite sides of the fault that is large enough to damage structures or break cables and pipelines.
- Earthquake shaking may (indirect impacts):
  - trigger landslides and rockfalls;
  - cause soils to liquefy;
  - or dams to fail.



Potential damage to EGI and Gas Pipelines, and associated social, environmental and economic risks.

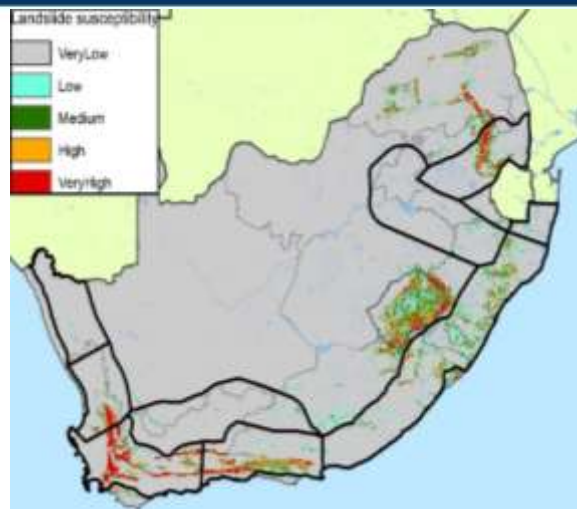
# Key findings from draft assessment

## SEISMICITY ASSESSMENT



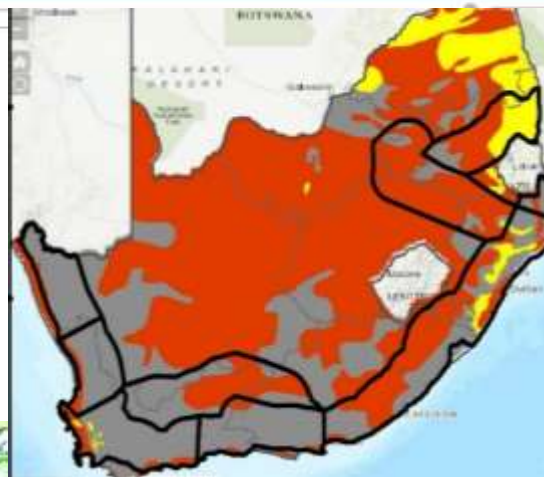
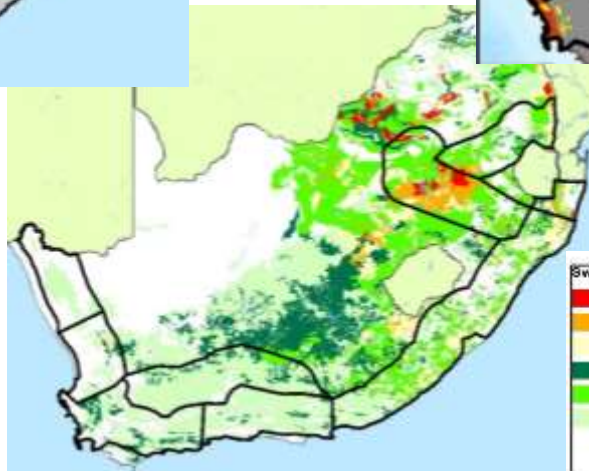
# Key findings from draft assessment

## SEISMICITY ASSESSMENT



**Landslides  
susceptibility**

**Swelling clays**



**Collapsing soils**

# Key findings from draft assessment

## SEISMICITY ASSESSMENT

### Best Practice Measures

- Conduct geological and geophysical investigations in “**sensitive**” regions
  - **Regions of elevated seismic hazard**
  - **Regions of elevated vulnerability - where local conditions might increase the hazard posed by secondary effects of earthquakes**
- Should these surveys indicate that there is a significant probability that EGI and Gas Pipeline damage thresholds will be exceeded, the EGI and Gas Pipeline should either be **relocated, reinforced or protected** (e.g. landslide nets).
- Install sensors and monitor both weak and strong ground motion to “sensitive” regions to improve hazard assessments.

EGI and Gas Pipelines that are built according to international standards are generally resilient to moderate levels of ground shaking.



# Demand Mapping

**SANBI**   
Biodiversity for Life  
South African National Biodiversity Institute

**CSIR**  
*our future through science*

# Objective

- Undertake an assessment to **determine** where energy is required within the municipalities.
- Identify areas earmarked for **future development & expansion** which require a significant amount of energy.
- Identify future development plans & energy requirements by **intensive energy users**.
- Upon completion of the energy demand mapping, the outputs will be used to **refine** the draft 125km corridor.

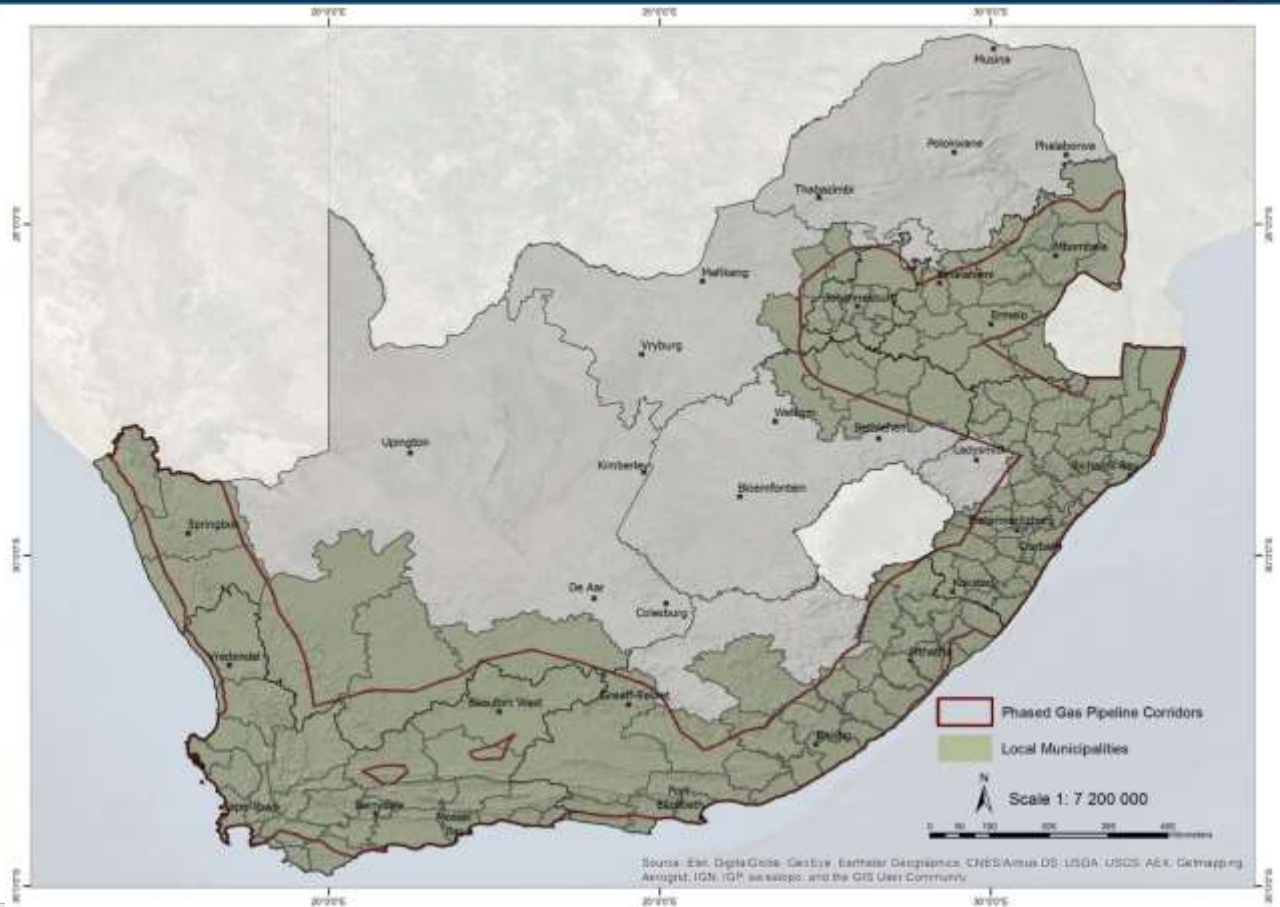
# Demand Mapping Analysis

# Demand Mapping Analysis

- **Demand Mapping** exercise was undertaken in parallel with the Specialist Assessment process.
- The exercise involved two processes:
  1. Assessing **SDF/IDPs** to extract information needed,
  2. Undertake **Authority & Industry** exercise to identify where future development will take place.
- **Features** that were mapped include:
  1. Industrial Development
  2. Priority Agriculture
  3. Mining
  4. Planned future transport



# Municipalities Assessed during Demand Mapping Exercise





# Demand Mapping Outputs

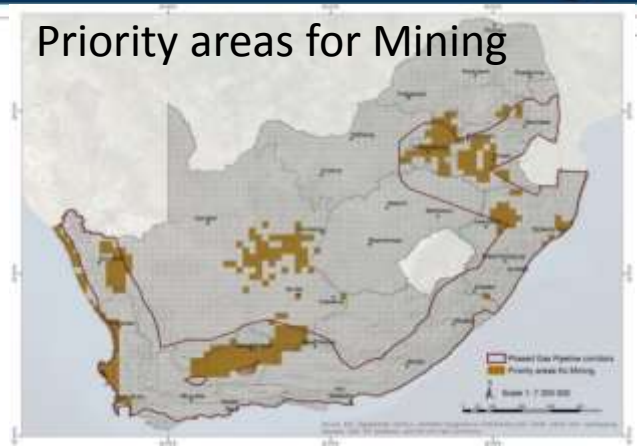
## Phased Gas Pipeline Corridors

# Outputs per Feature

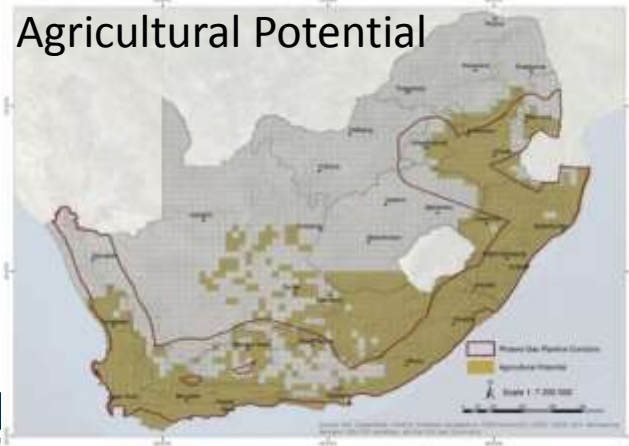
## Industrial Development



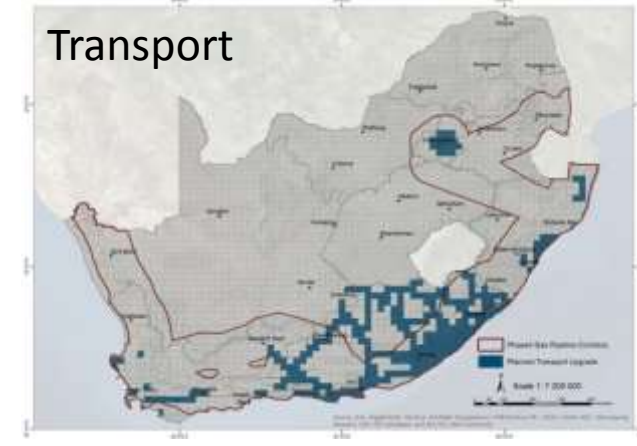
## Priority areas for Mining



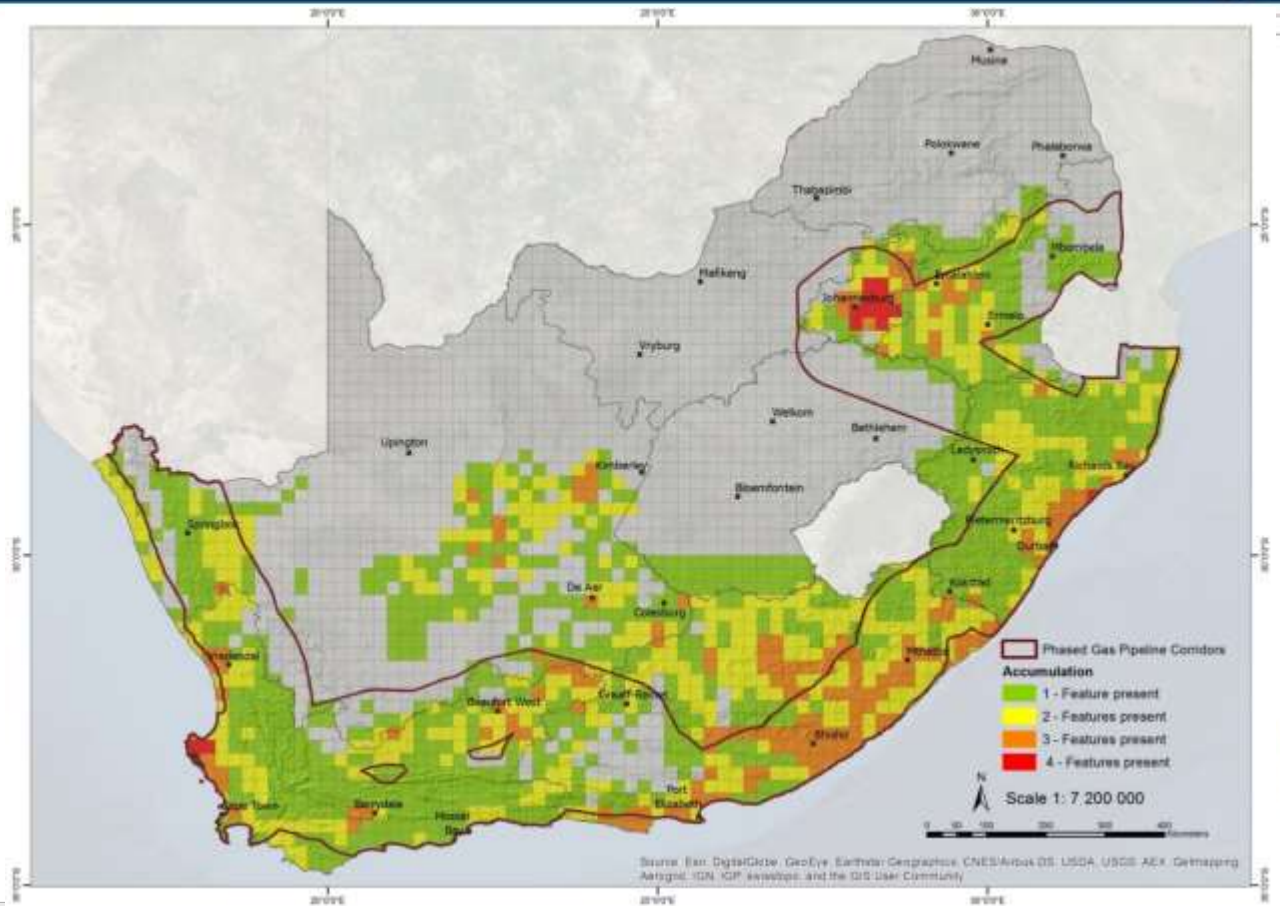
## Agricultural Potential



## Transport



# Phased Gas Pipeline Cumulative Map



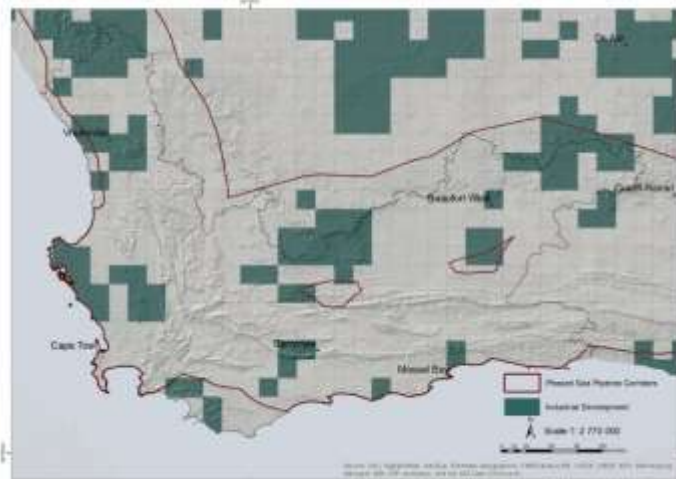
# **Demand Mapping Outputs** **Provincial view – WESTERN CAPE**

## **Phased Gas Pipeline**

# Grid



## Agricultural potential

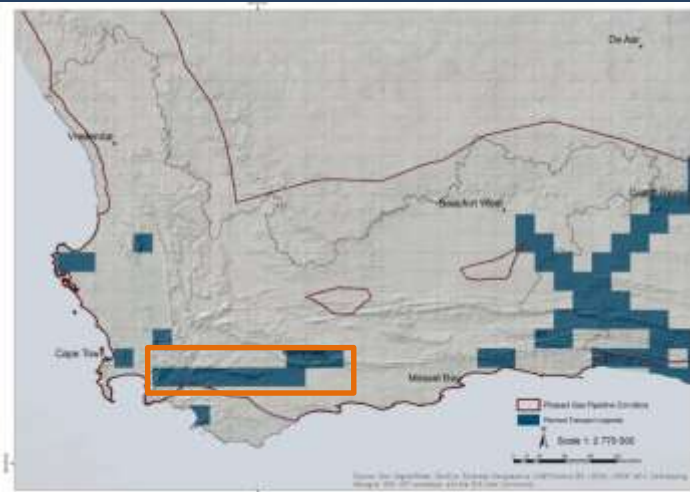
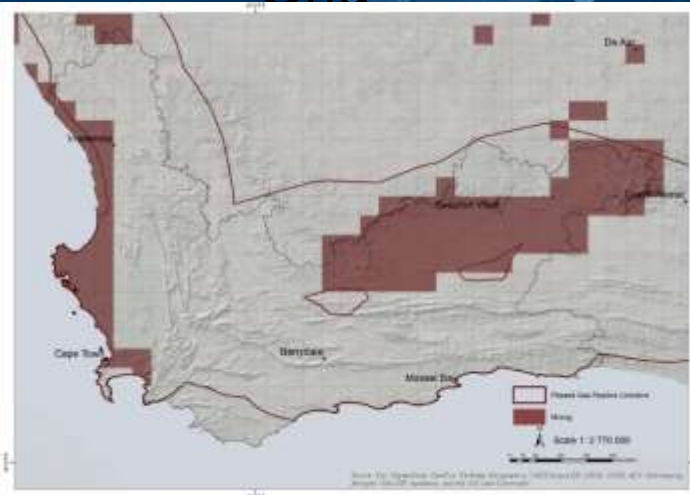
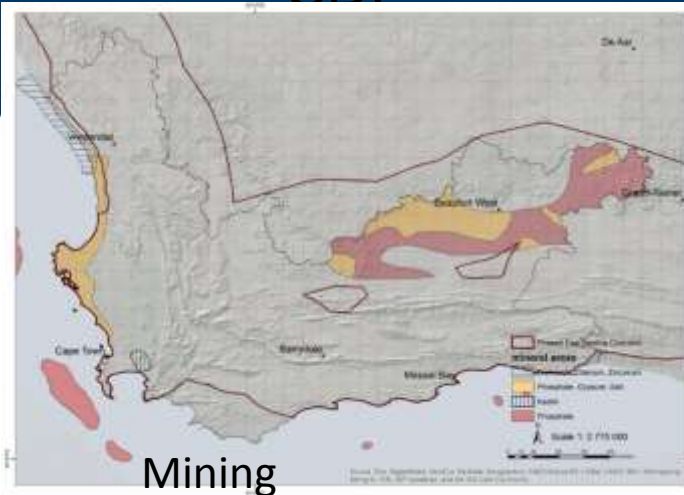


## Industrial Development

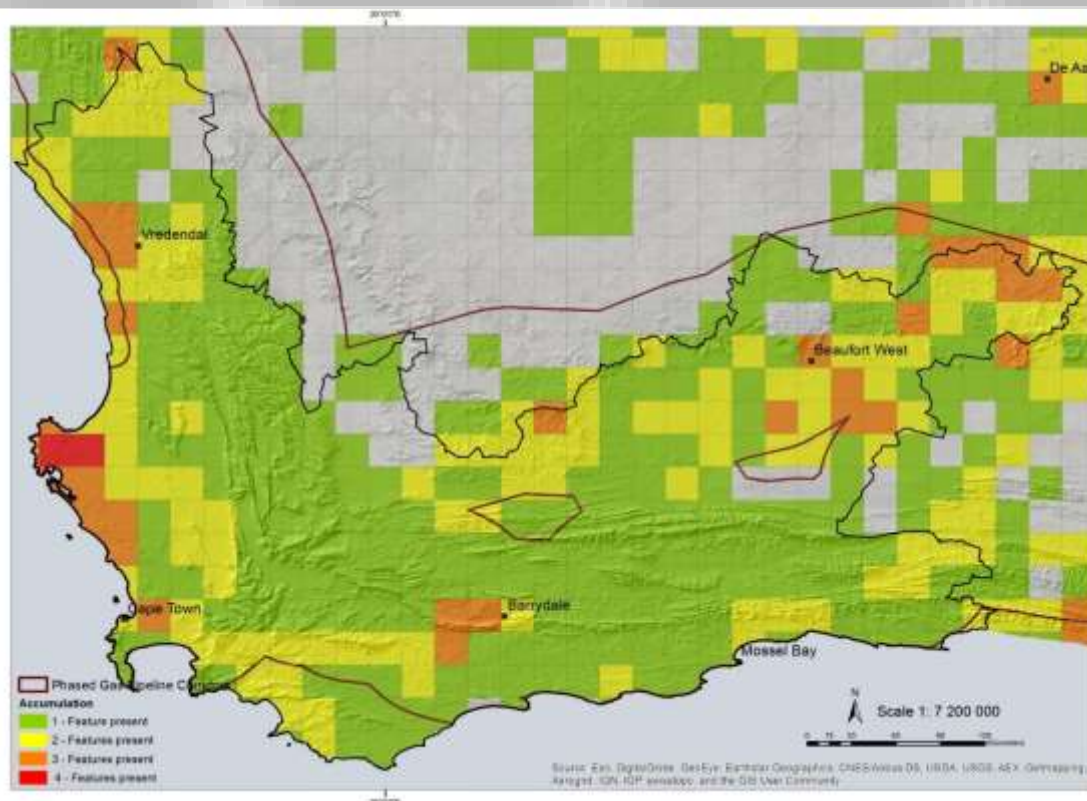
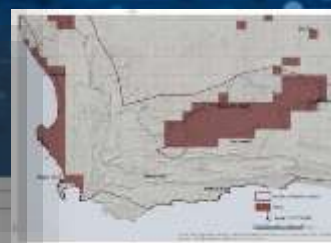


# SDF

# Grid







# **Demand Mapping Outputs** **Provincial view – NORTHERN CAPE**

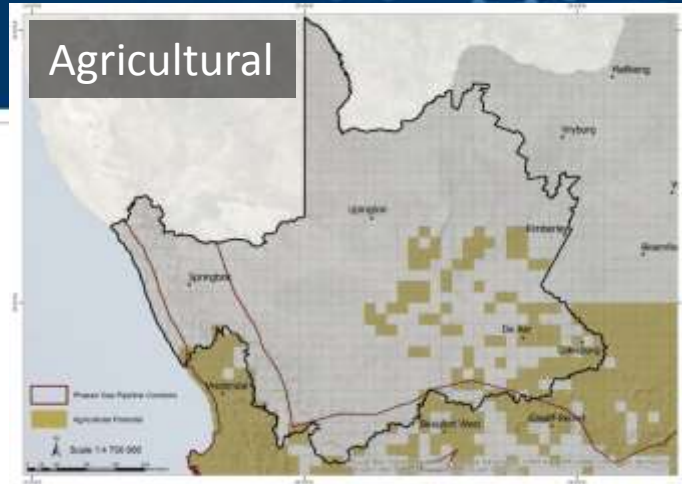
## **Phased Gas Pipeline**

# SDF

## Agricultural

# Grid

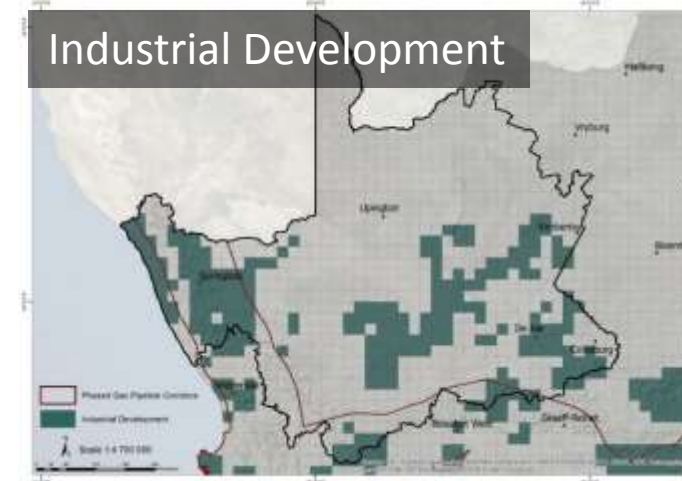
## Agricultural



## Industrial Development



## Industrial Development



# SDF

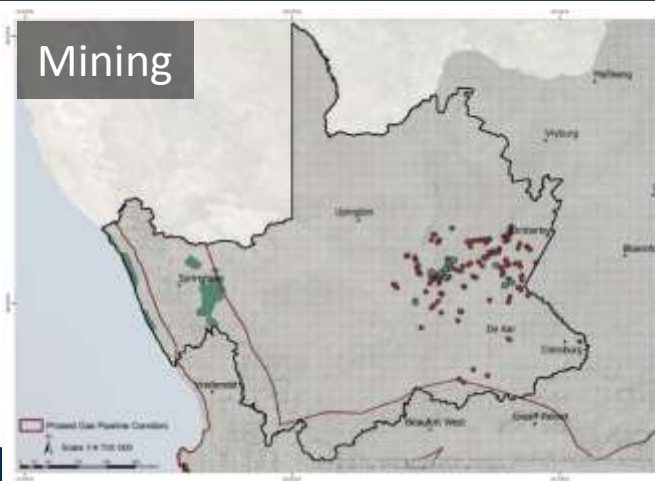
## Transport

# Grid

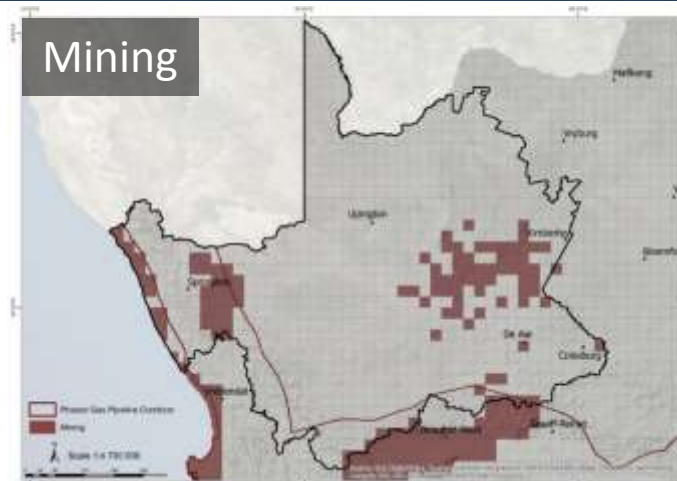
## Transport



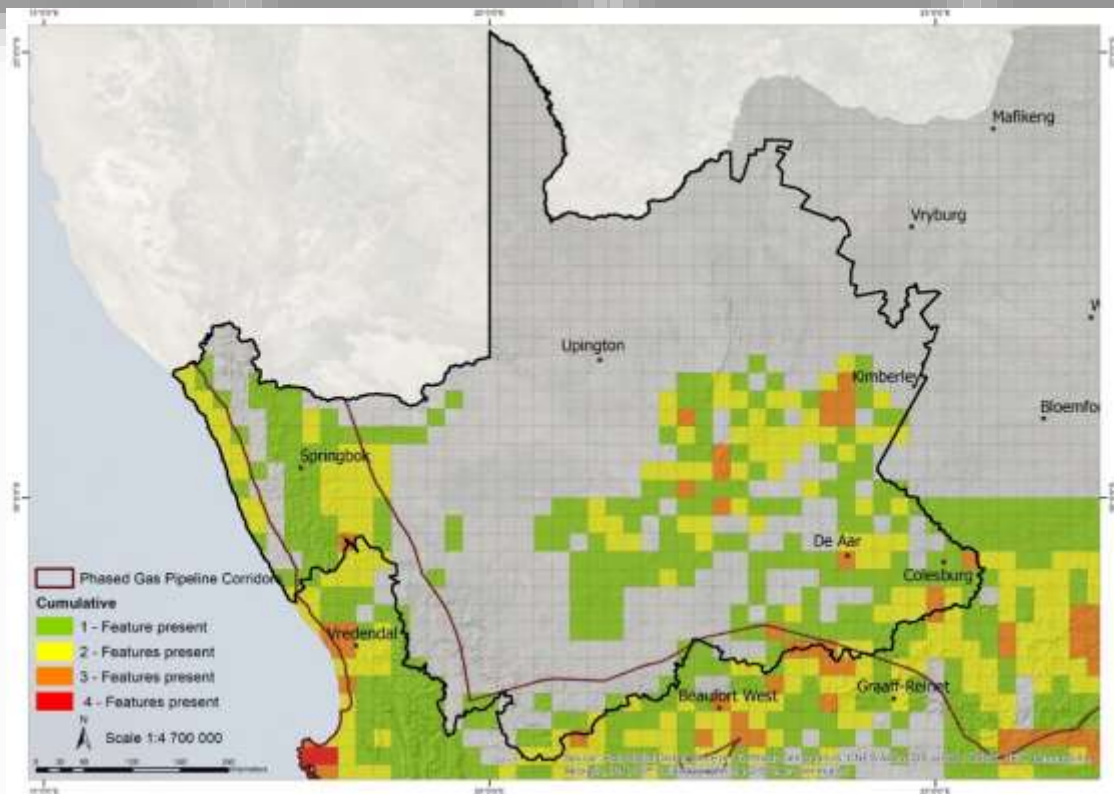
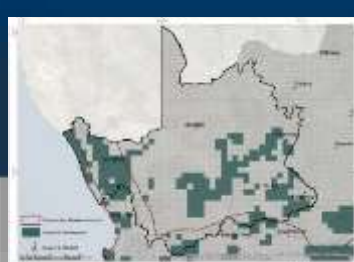
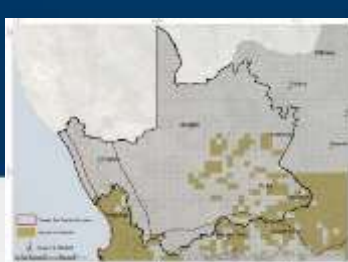
## Mining



## Mining







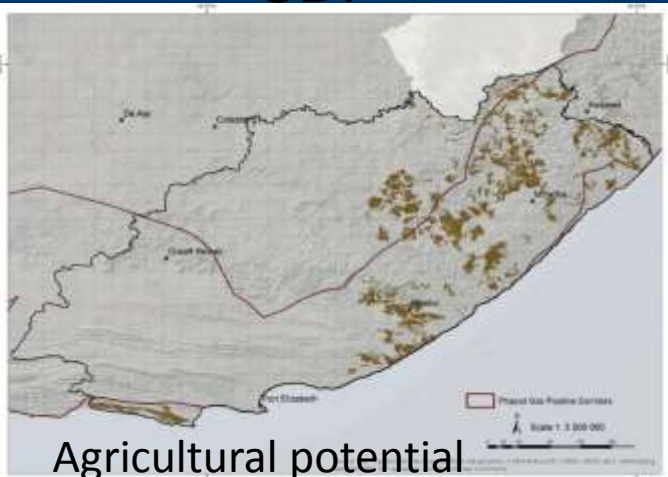
# **Demand Mapping Outputs** **Provincial view – EASTERN CAPE**

## **Phased Gas Pipeline**

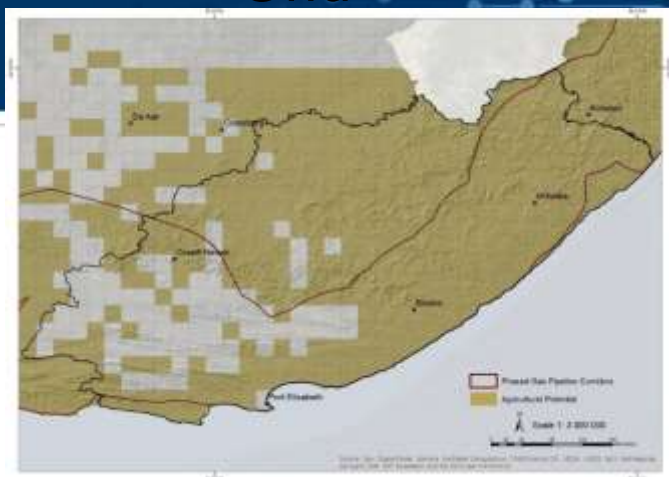


# SDF

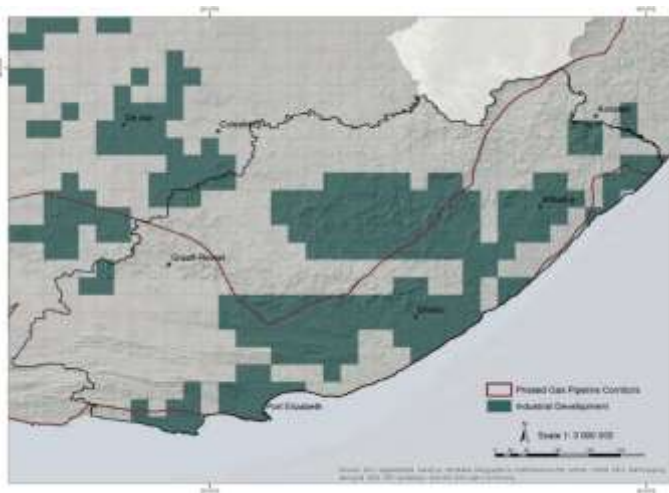
# Grid



Agricultural potential



Industrial Development

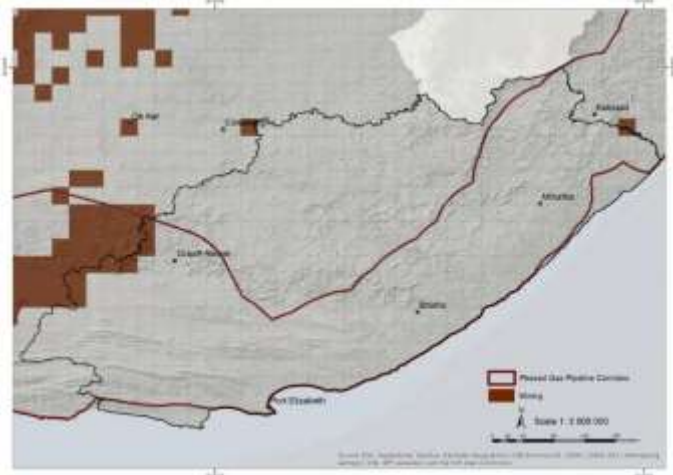
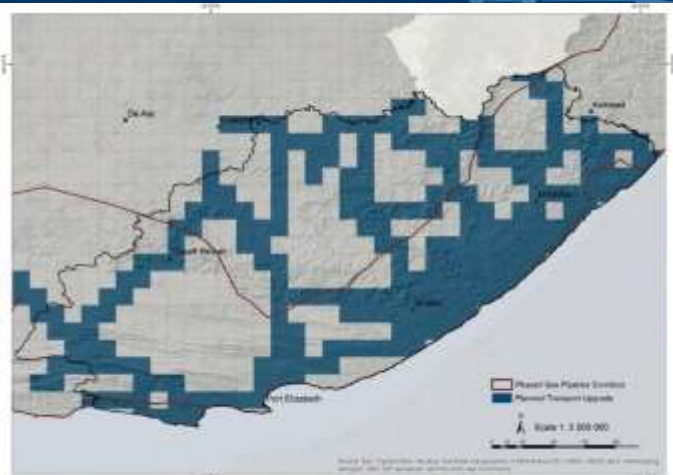


# SDF

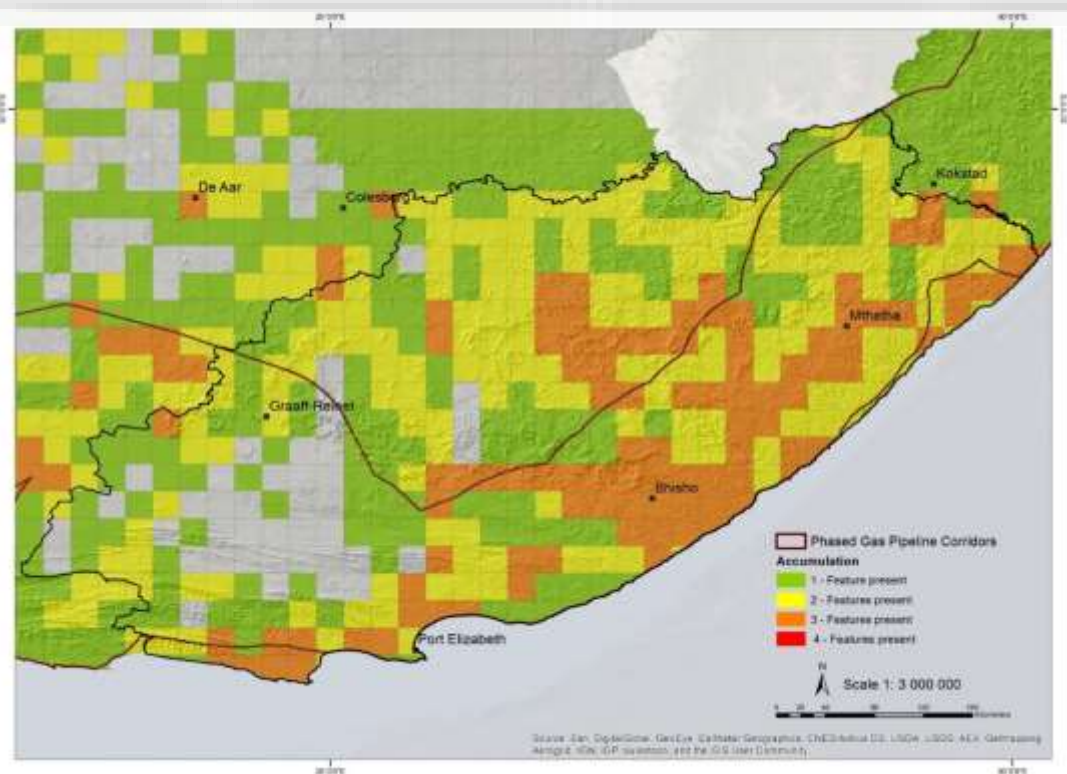
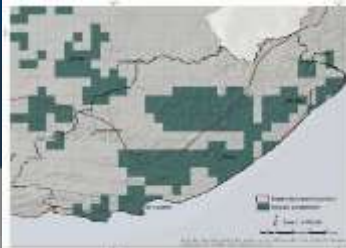


Planned Transport upgrade

# Grid



Mining



# **Demand Mapping Outputs** **Provincial view – GAUTENG**

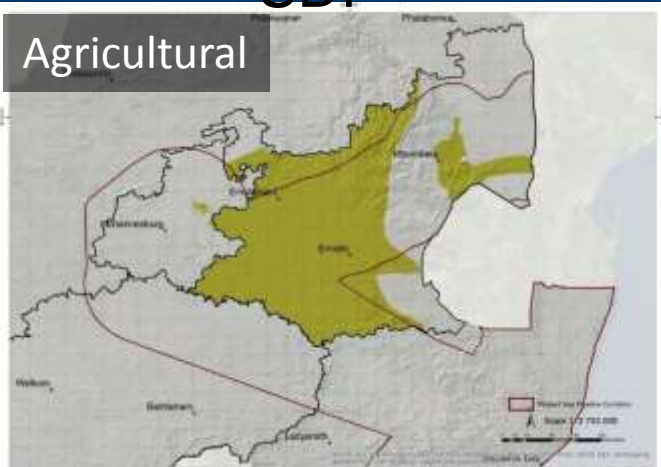
## **Phased Gas Pipeline**



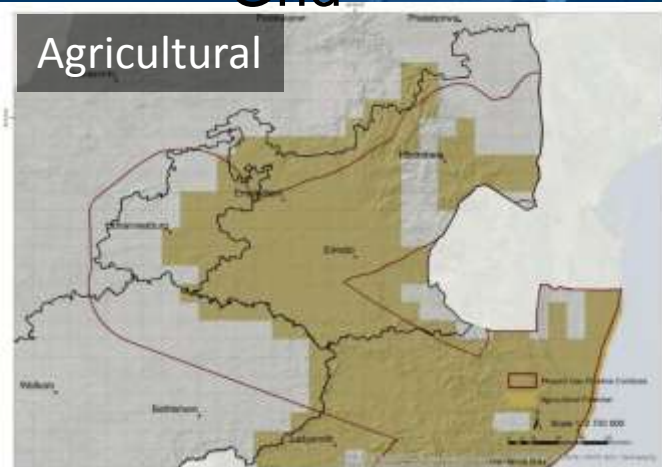
# SDF

# Grid

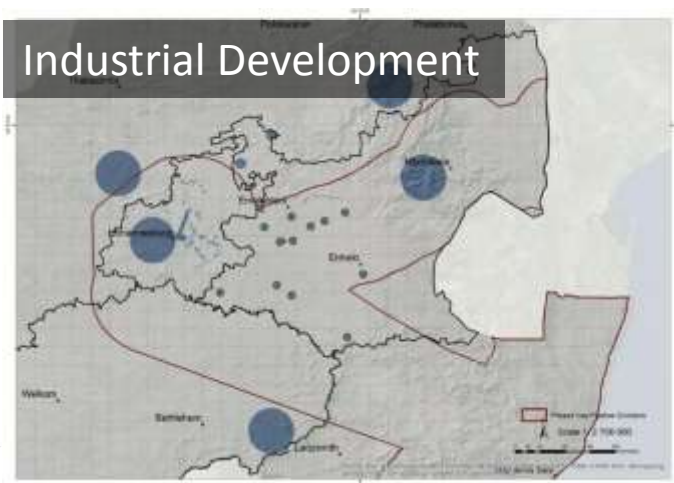
# Agricultural



# Agricultural



# Industrial Development



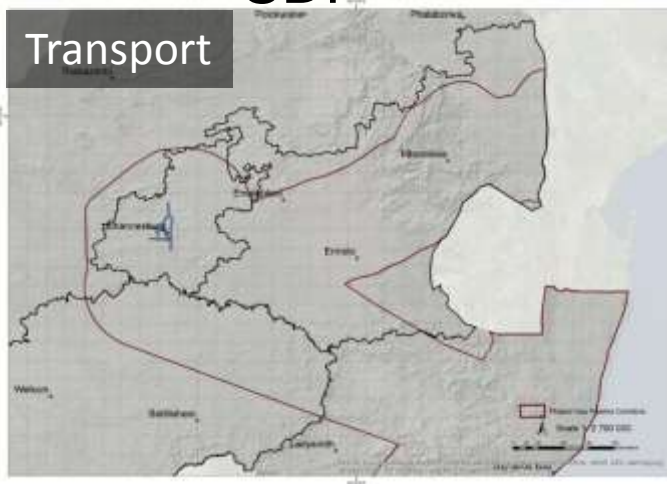
## Industrial Development



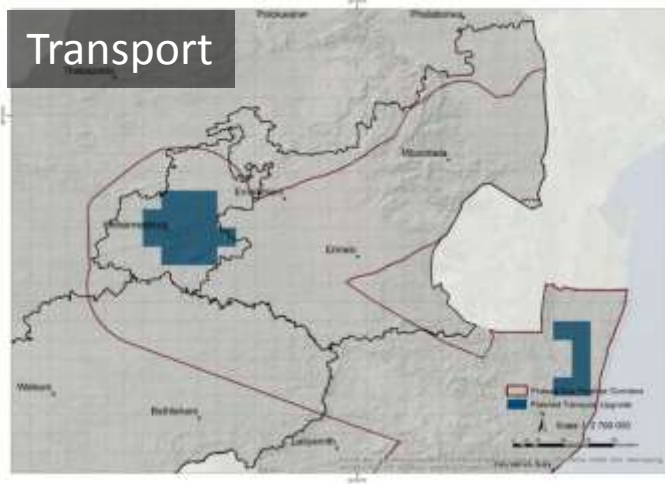
# SDF

# Grid

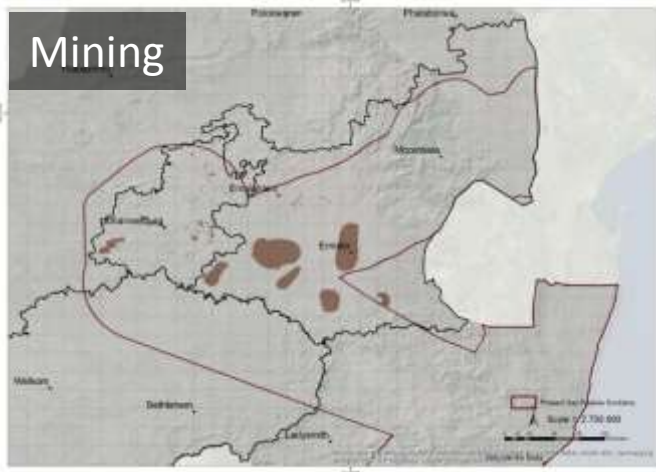
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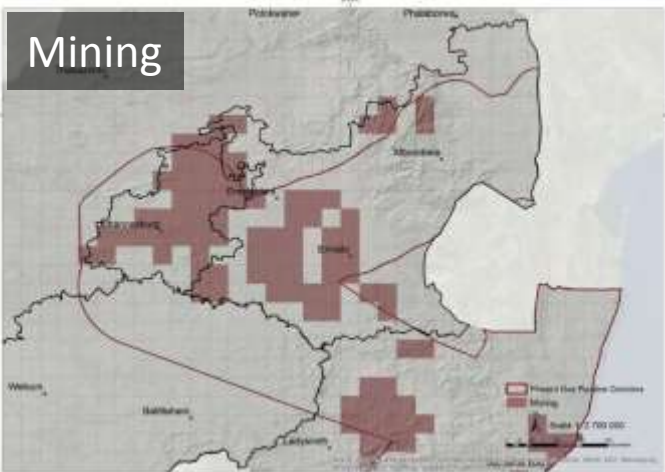
## Transport



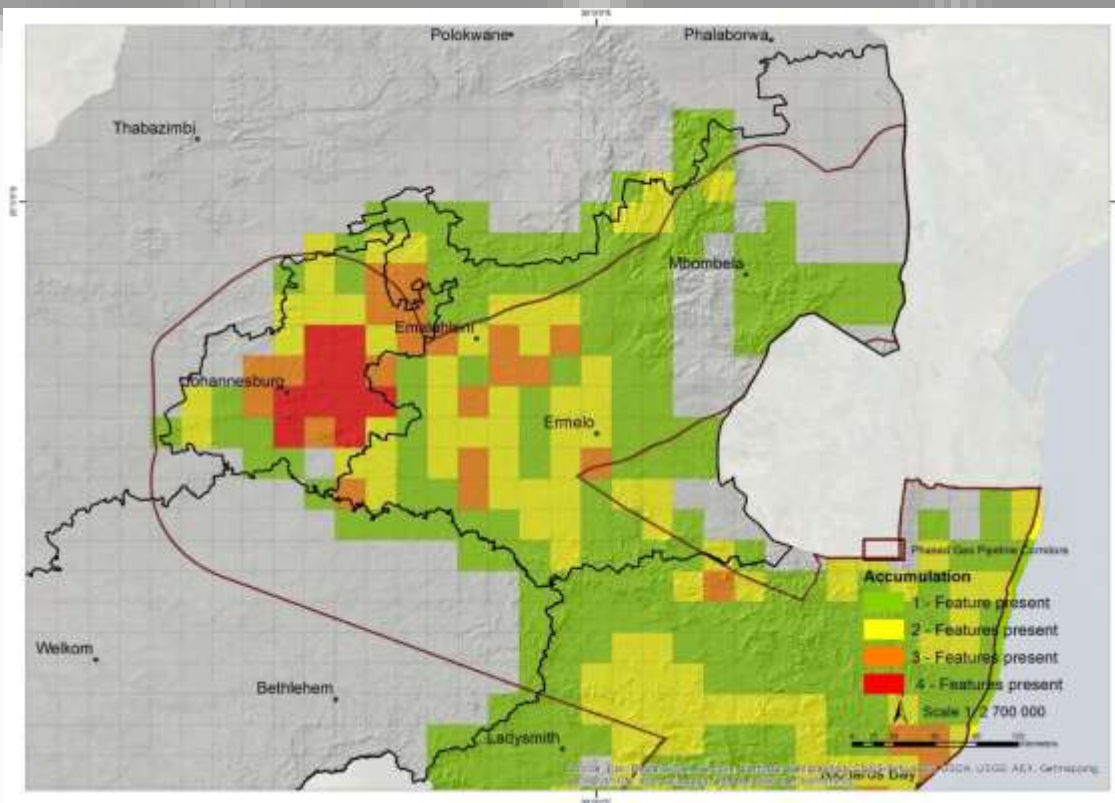
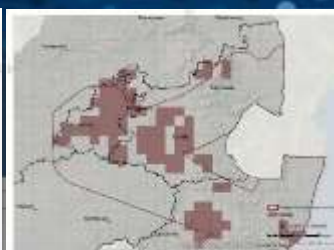
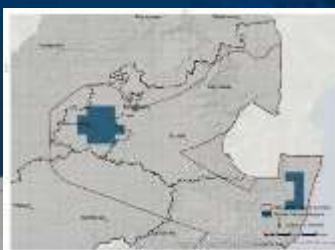
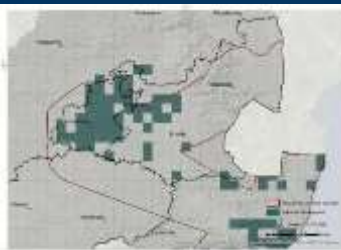
## Mining



## Mining







# **Demand Mapping Outputs** **Provincial view – KWAZULU NATAL**

## **Phased Gas Pipeline**

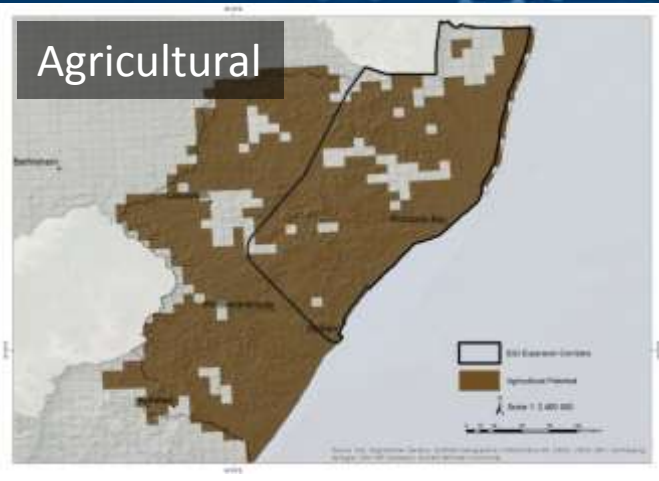
# SDF

# Grid

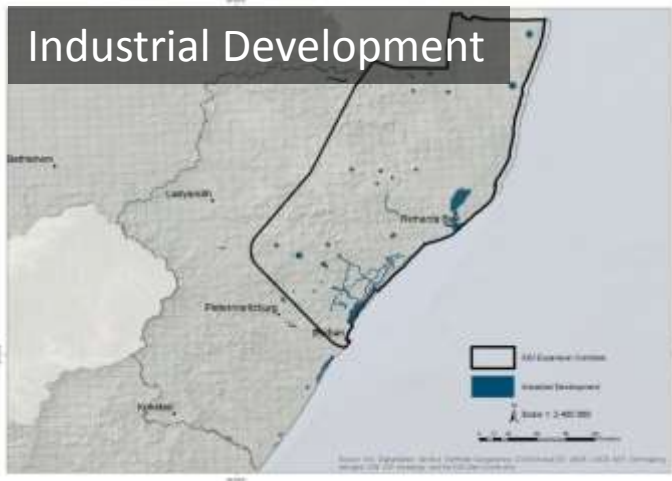
## Agricultural



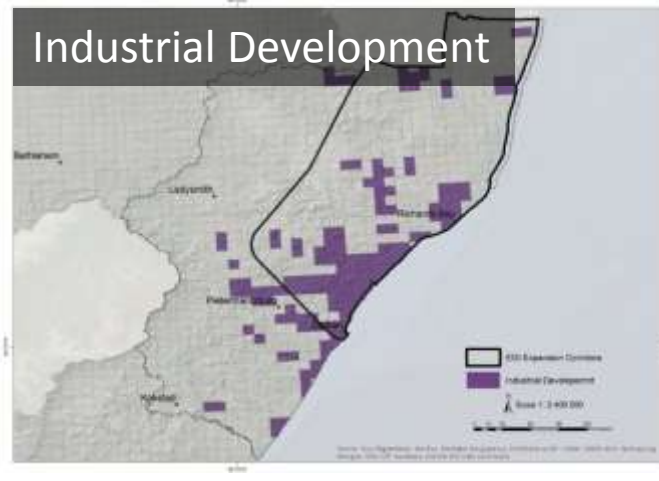
## Agricultural



## Industrial Development



## Industrial Development



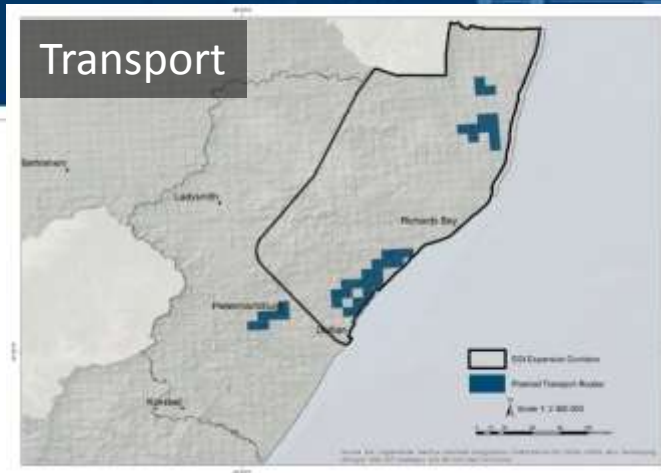
# SDF

# Grid

## Transport



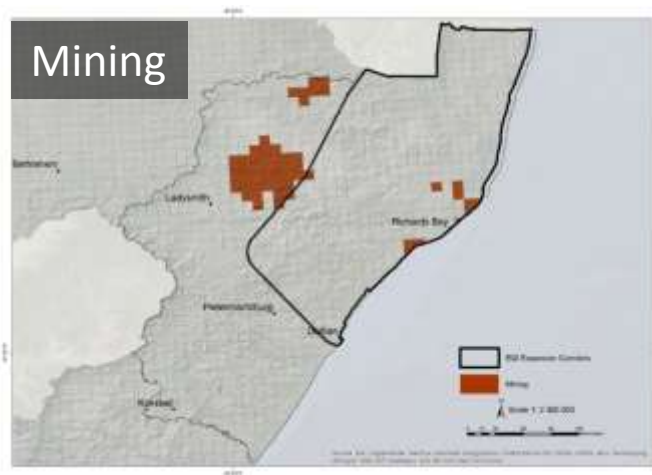
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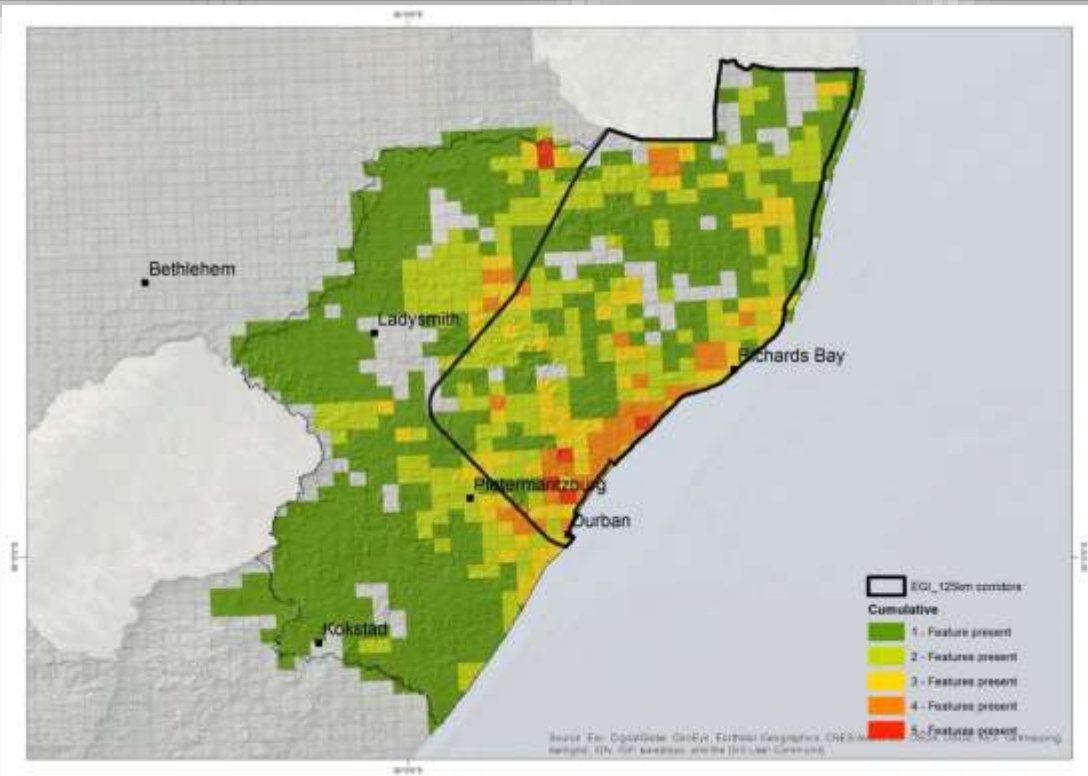
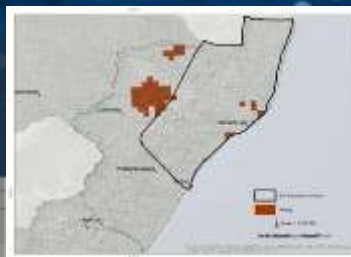
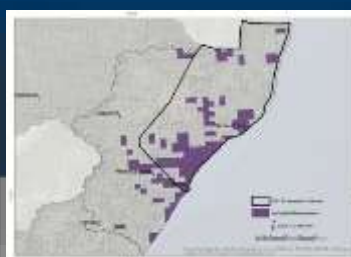


## Mining



## Mining







# Demand Mapping Outputs

## Electricity Grid Infrastructure Expansion Corridors





# Way forward

- The outputs of the Demand mapping exercise, pull and push factors considerations, Engineering constraints and Specialists Assessments
  - Will be used to **refine** the 125km draft corridor back to 100km wide corridor

# Project Way Forward

Key Stakeholders Consultation  
ERG, PSC, Sector Specific Meetings

Public outreach 1

Public outreach 2

## PHASE 2

PHASE 1:  
Inception

**Task I**  
Initial Corridors  
(Starting Point)  
June 2017

Preliminary  
Corridors



**Task II**  
(Negative Mapping)  
Sept-Oct 2017

W2W  
Environmental  
Constraints Map



W2W  
Engineering  
Constraints Map



**Task III**  
(Corridor Refinement)  
Nov 2017 – Jan 2018

Draft  
Corridors



Draft Corridor  
Environmental  
Constraints Map



**Task IV**  
(Environmental Assessment)  
Oct 2017 – July 2018

Specialist  
Studies



We are here  
Draft Specialist  
Report Finalisation

Review and  
Final corridor  
alignments

**PHASE 3**  
Decision-support  
outputs and  
Gazetting

2019  
SEA Outputs

Final Corridors

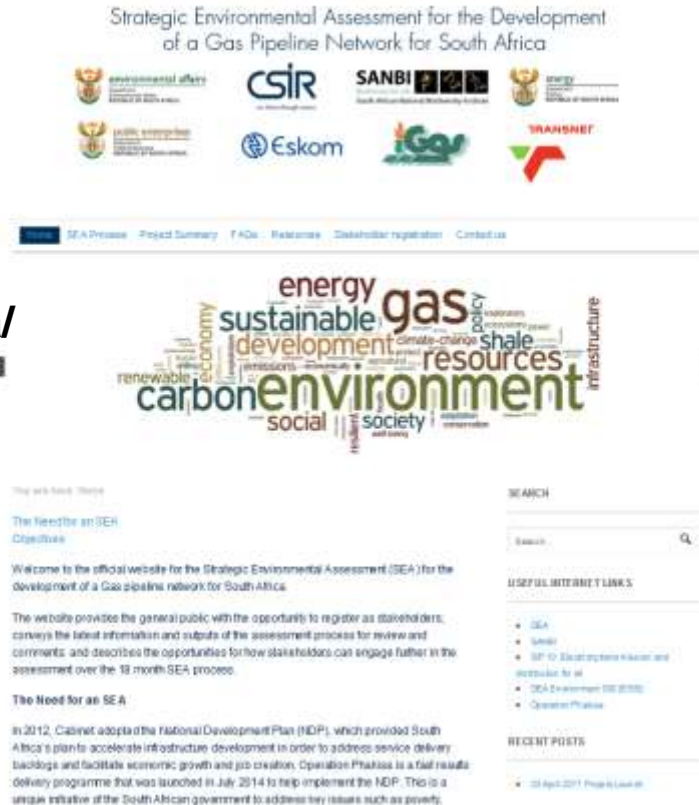
Final Corridor  
Environmental  
Constraints Map

Standards, EMPr  
and Protocols

# Project Website

**Project Email Address:**  
**gasnetwork@csir.co.za**

**Project Website:**  
**<https://gasnetwork.csir.co.za/>**





Thank you