

# SPOT 5 LAUNCH SANSA Innovation Hub Pretoria

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Powering your world



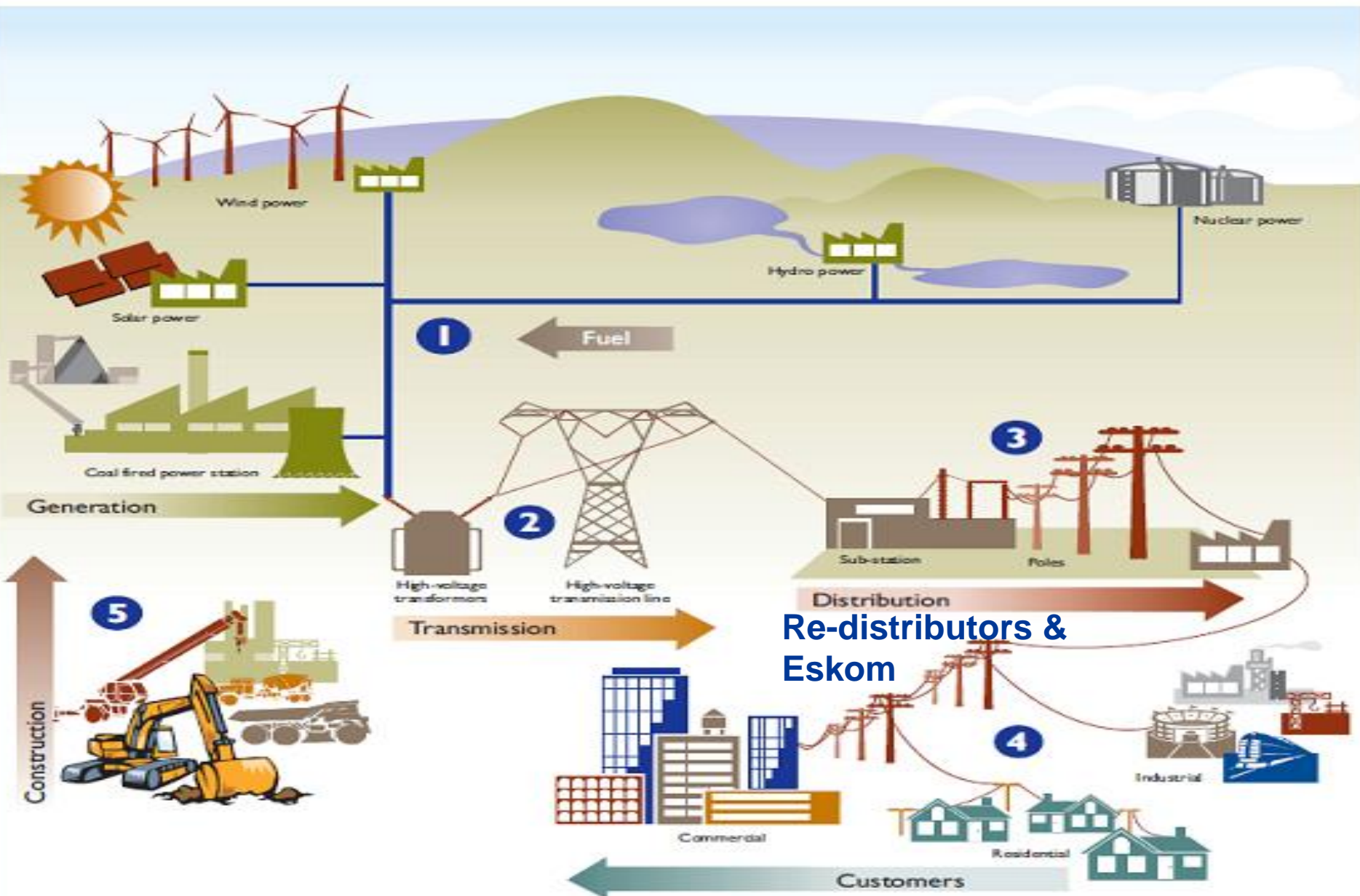
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## The Electricity Supply Industry Geographic Information systems (ESI-GIS)

- Formed during 2002
- To develop, manage and supply spatial information solutions within the local and African Electricity Supply Industry (ESI),
- Made up of a diverse team of professionals with the skills, expertise and experience to address the GIS requirements of the ESI business.
- We are committed to develop skills and to provide a platform for growth. - reflected in the ESI-GIS internship & bursar initiatives.
- Now part of the Planning & GIS section, under the Power Delivery Engineering Dept. in the Technology Division
- We work in partnership with a panel of external service providers

# Eskom Value Chain



# Short history of Imagery Acquisition Within Eskom and Value added product

- +/-2000 CSIR, Land Cover Scale 1:50 000
- 2002-2004 Eskom Change detection based on HELP National Land Cover Landsat
- 2006 – Current Spot 5 (Government Consortium )
- Now Spot 6



# Demographic Change Mapping

In March 2002 Eskom Distribution's Esi-Gis commissioned the demographic change consortium of the CSIR Satellite Applications Centre and Geospace International to conduct a demographic change mapping project. The project allowed the existing databases to be combined with current satellite imagery in order to ultimately detect urban and rural growth for the entire country. The project provides information that will assist Eskom Distribution to identify current growth areas as well as enabling projects about future trends in population growth as input into national and regional electrification programs. In the short term, Eskom Distribution will use the change detection data to ensure that the maximum possible benefit is gained from the located electrification budget, but the long-term goal is to develop a product that will successfully guide South Africa's investment in the broader infrastructure development context. This is in support of Eskom's stated strategy of vigorously promoting economic growth in South Africa, its regions and the rest of Africa, and supporting social and economic objectives in these markets.

## Methodology

The change detection data was compiled by comparing mapped information of the 1996 Enumeration Areas - derived from the country's 1996 Census data - with data obtained from the Landsat satellite in 2001. Modern digital mapping techniques were used to create a baseline GIS layer from the 1996 EAs that incorporate all urban and rural change since 1996. The methodology follows:

### Step 1. Base Map Creation

Select EA polygons smaller than 2000 and merge to base map.  
Overlay EA base map on imagery.  
Also add NLC and Help database.  
Check areas where no EA, but NLC shows urban settlements.  
Copy NLC polygons into base map layer.



### Step 2. Mapping Change per Province

Merge Multispectral (742-RGB) & Panchromatic bands.  
Create grids to monitor mapping progress.  
Create new vector layer for provincial change.  
Map change in following sequence:  
Identify urban areas not covered by base map polygons.  
Minimum mapping unit (MMU) should be 50a.  
Mapping scale in view is 1:50



Urban Change  
Base Data

### Step 3. Quality Check

Check all the mapped grids on a 1:50 000 scale.  
To check if all the grids have been mapped, pan to check if mapping is complete throughout.

## Product

The final product is a baseline vector layer of the enumeration areas, together with a vector layer of areas of growth. Within a GIS environment, it is then possible to mark and analyse the largest areas of growth per province or district. Moreover by combining the existing Eskom Distribution grid with the change layer, it is possible to statistically determine areas most suited to extension of the network based on current demographic trends.

## Conclusion

Eskom Distribution's decision to procure this product will allow other potential users access to this important data set. Provincial, local planning and housing departments, development agencies, map makers and retail site planners can all benefit. Statistics SA has also expressed an interest in the product for estimating population and ultimately reducing census for a future version. The final product will be delivered in December 2002, but most provinces are already commercially available from the change consortium. It is envisaged that through the sale of the change product the current project which is scheduled to include 2002 and 2003 satellite image-based change mapping will allow for an annually transmitted standard product.



## Objectives of Value Added Product

- Demographic Mapping
- Growth rate analysis
- Change detection
- Socio economic trends
- 1996 CSIR Land Cover (NLC) Scale 1:250 000  
HELP & Landsat
- +/-2000 CSIR Land Cover  
Scale 1:50 000
- 2002-2004 Eskom  
Demographic Change  
detection based on HELP  
NLC and Landsat

# Short history of Spot 5 Value Added Product (Land Cover)

- CSIR and the Consortium
- 2007 Eskom Spot Building Count only until 2016/7
- 2008 NWP and GTI SPOT5
- 2008 Freestate and GTI SPOT5
- 2009 CSIR Change Detection 1994 – 2000 – 2009
- 2009 Mpumalanga (“light land cover”)
- 2009 KZN Wild Life Society Various Base maps
- 2010 Eskom (Limpopo) SPOT5
- 2011 Gauteng GTI SPOT5

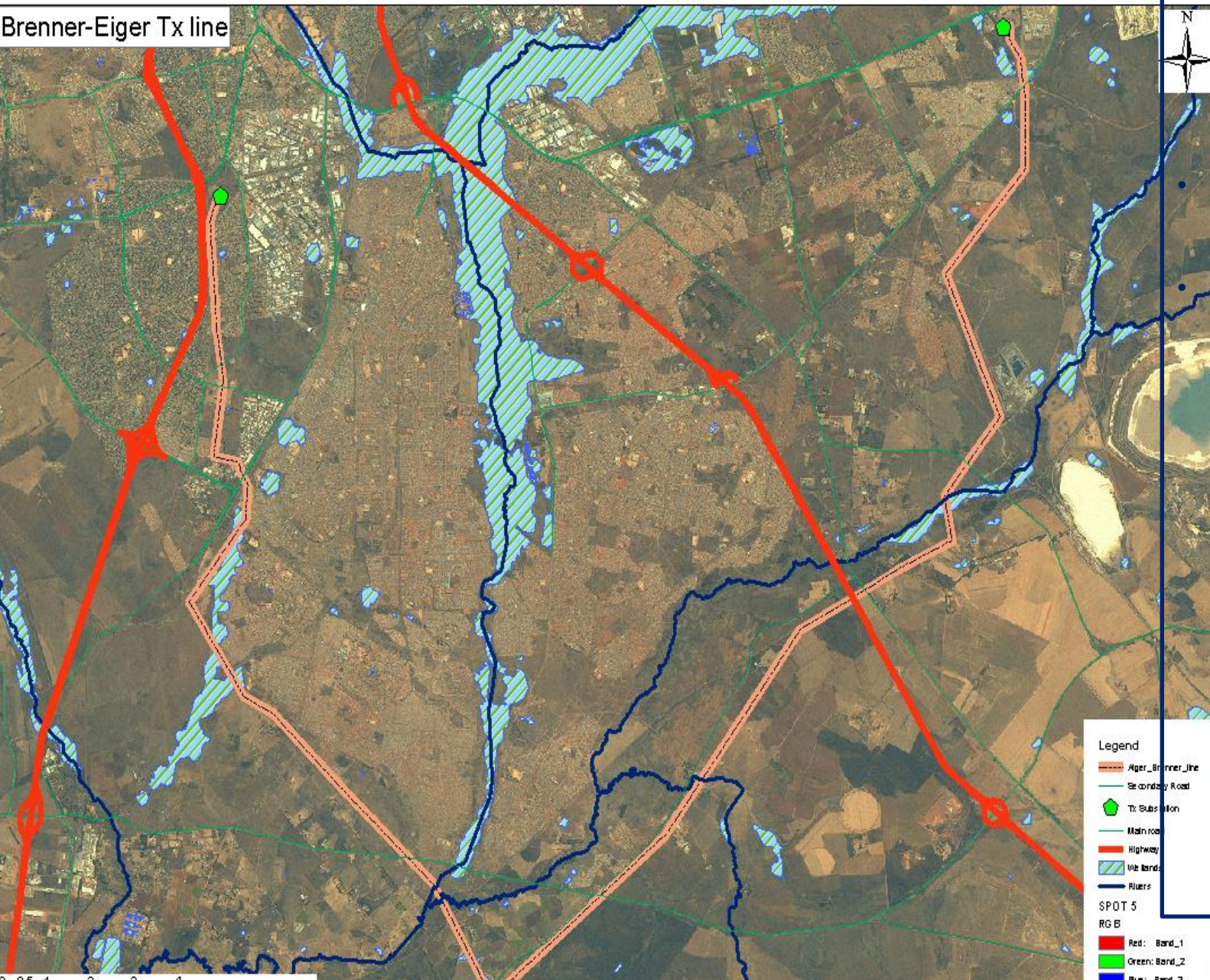
- **Electrification**
  - Planning
  - Design
- **Route and Site Selection**
  - Environmental
- **Socio Economic evaluation**
  - Trends
- **Change detection**
  - Trends
- **Group security**
  - Encroachments
  - Safety
  - Theft conductor illegal connections
- **Planning**
  - Load forecasting



- **Disaster management**
- **Vulnerability and risk Assessments**
- **Ecological management**
- **Monitoring the effects of climate change**
- **Environmental forecasting**
- **Environmental impact assessment**
- **Policy development**
- **Footprint future evidence**

# Power Line Maintenance

Brenner-Eiger Tx line



## Objective

- Access road Planning
- Identification of Security threat

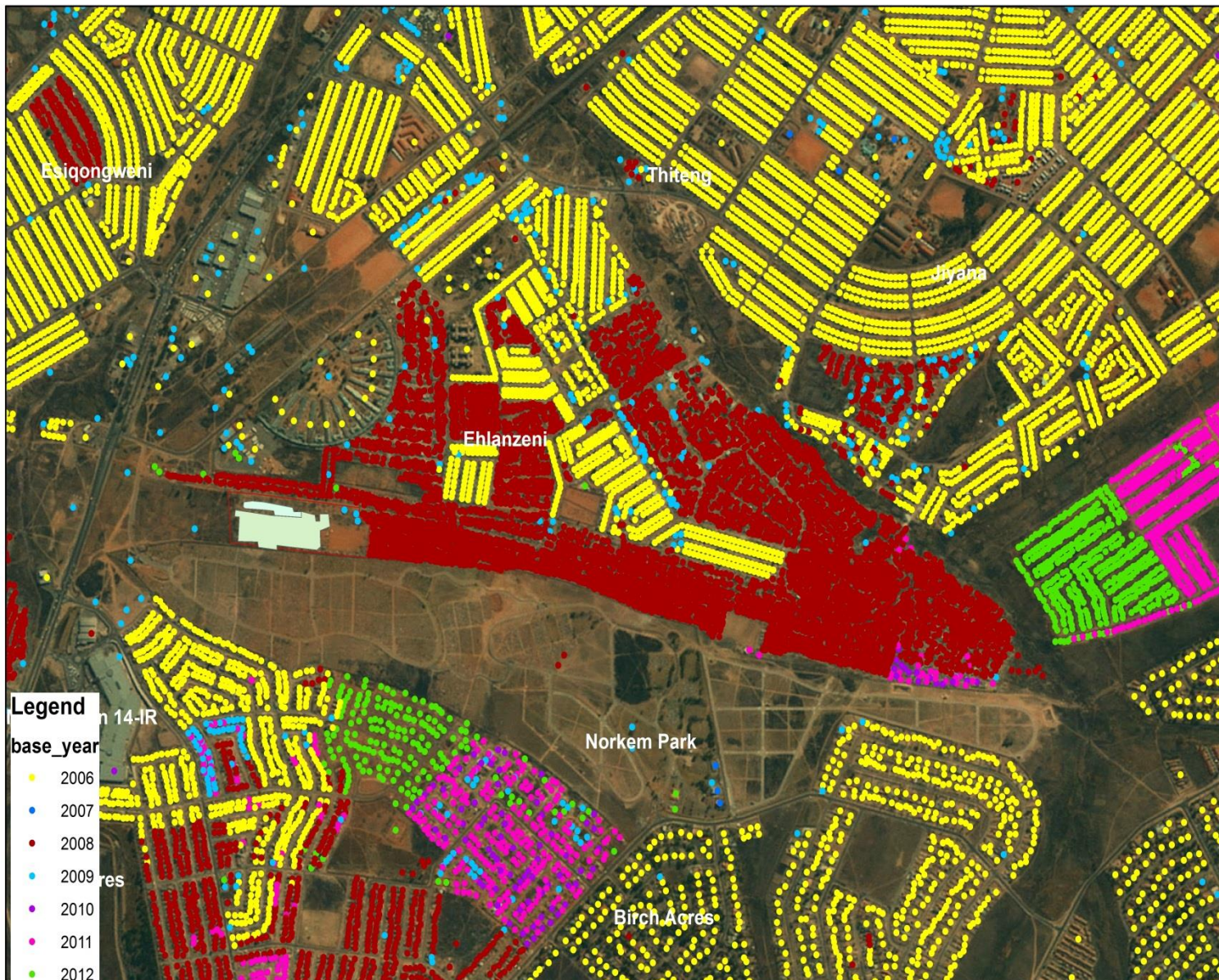


# Current Use of SPOT 5

## Objective

Use Spot 5  
images for SBC  
project;

Capture each  
Dwelling in SA as  
a point;



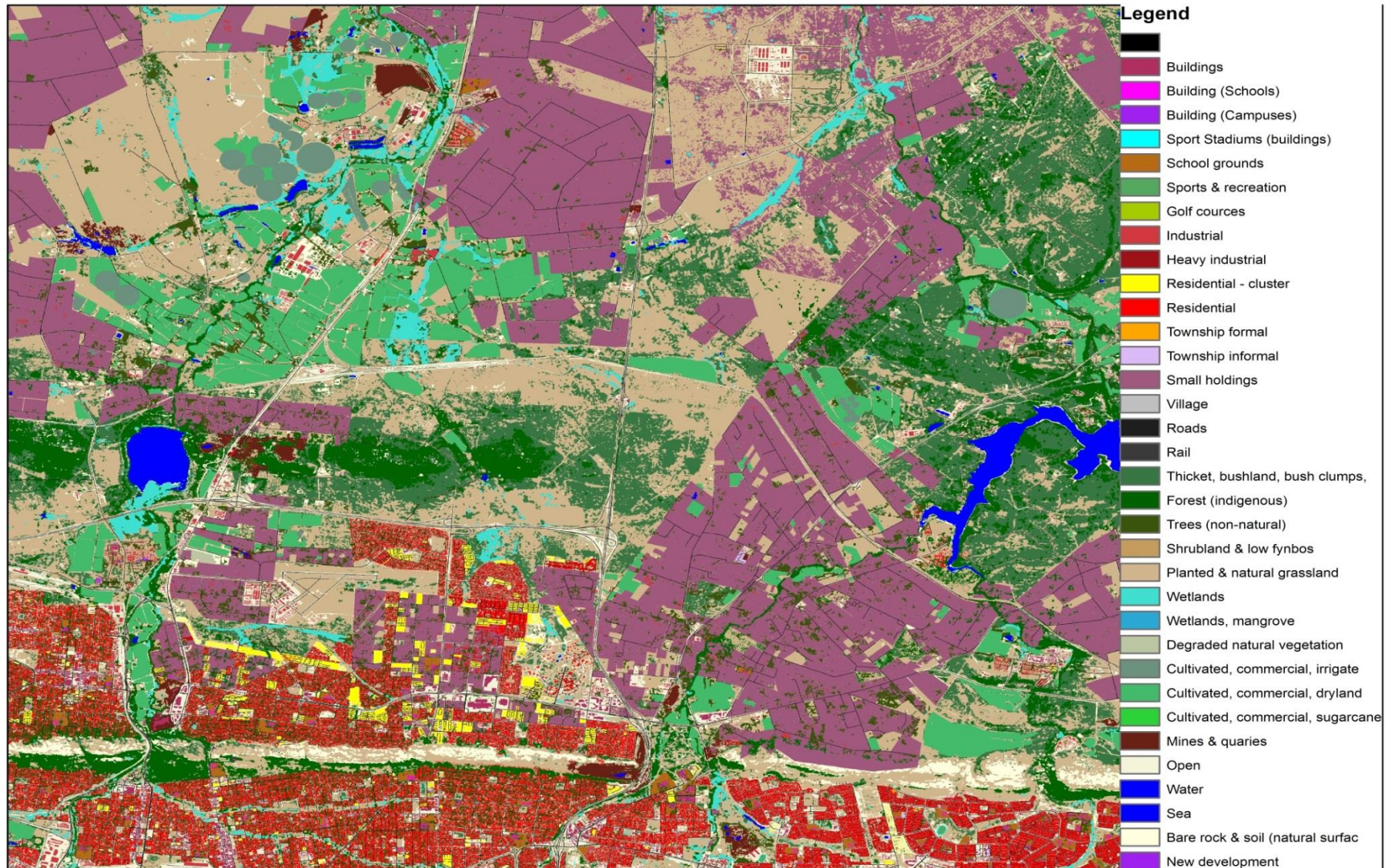


# Current Use of SPOT 5 (continue)



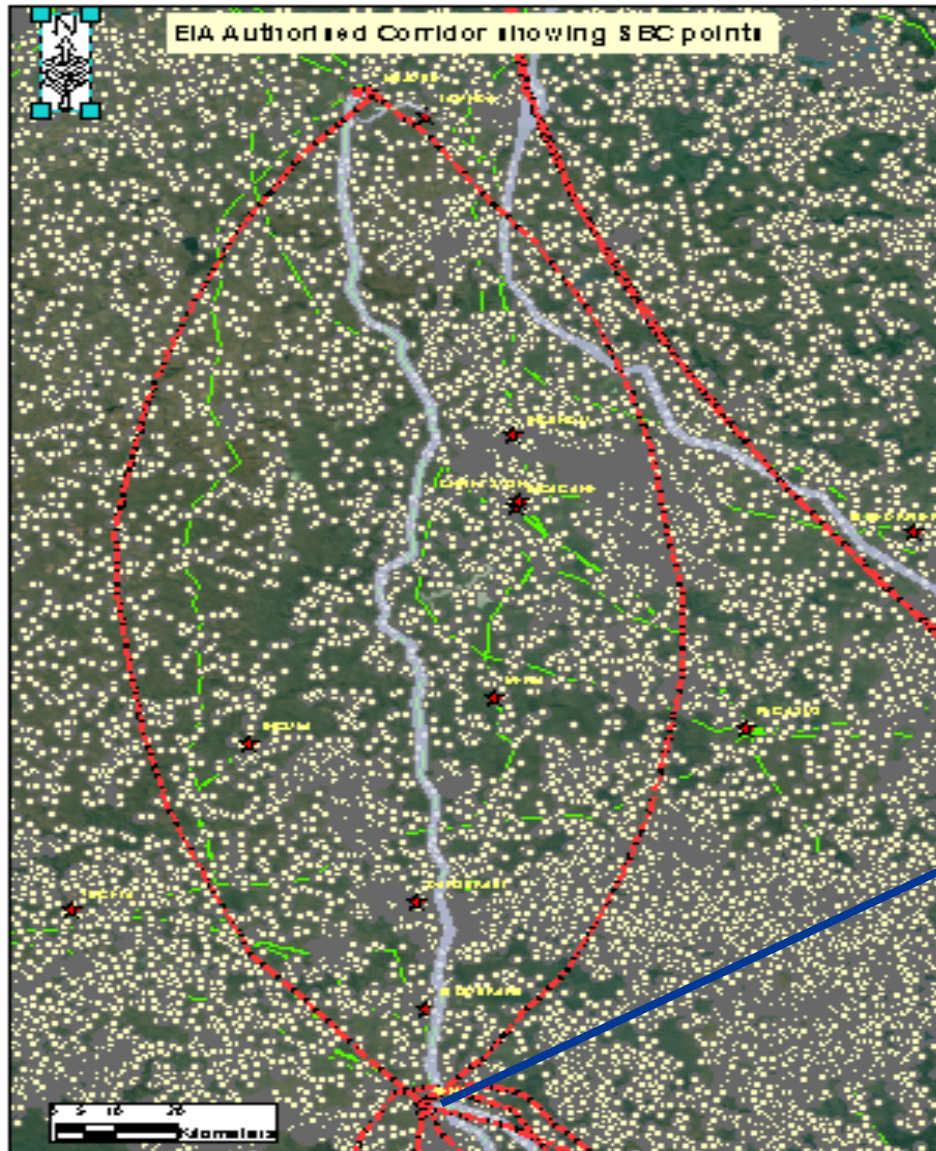


# Limpopo Land Cover



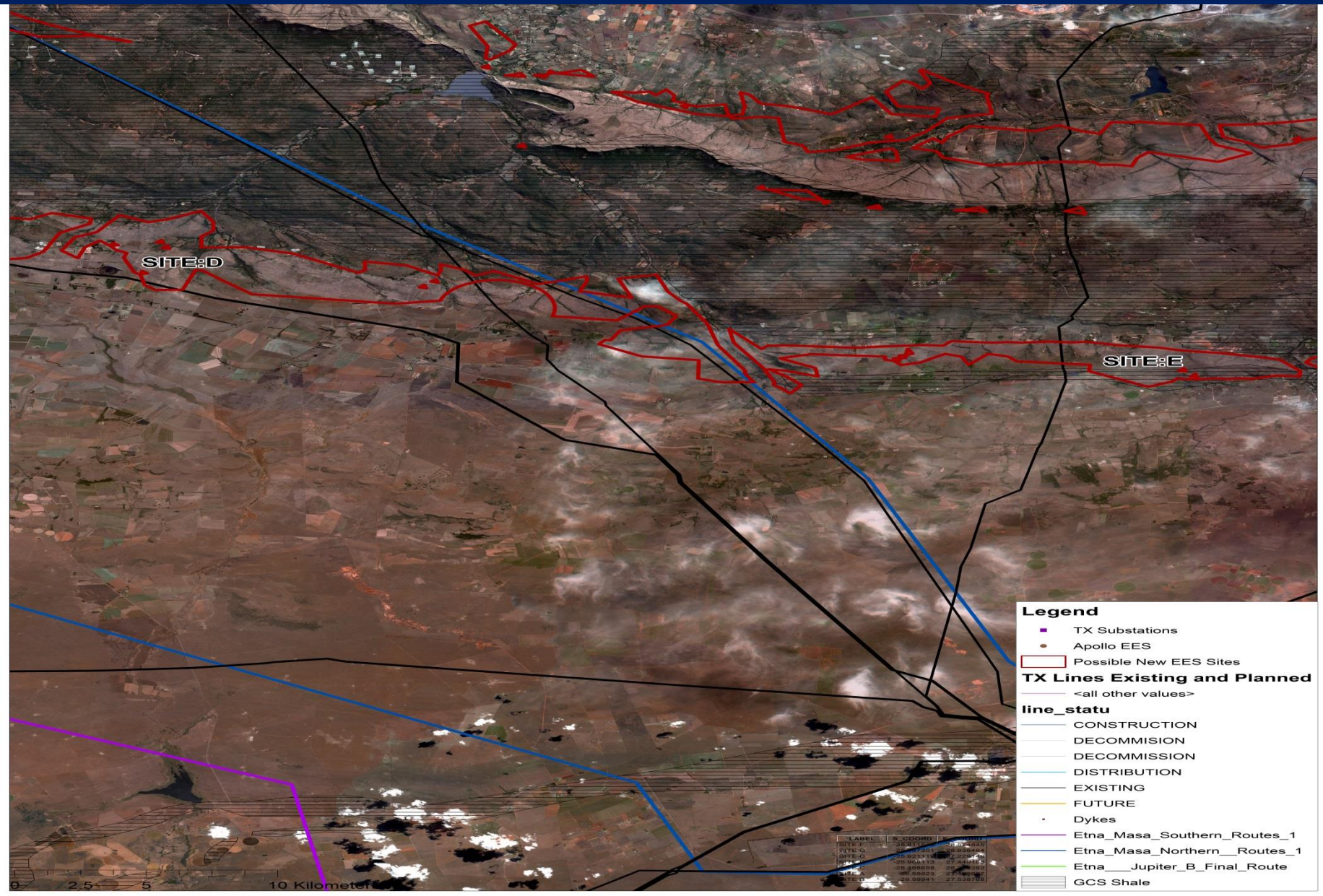


# Route Selection





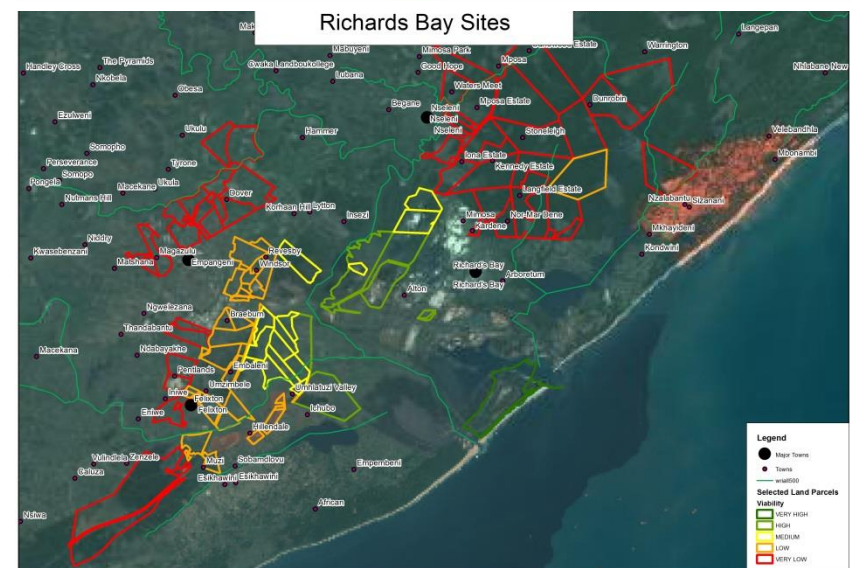
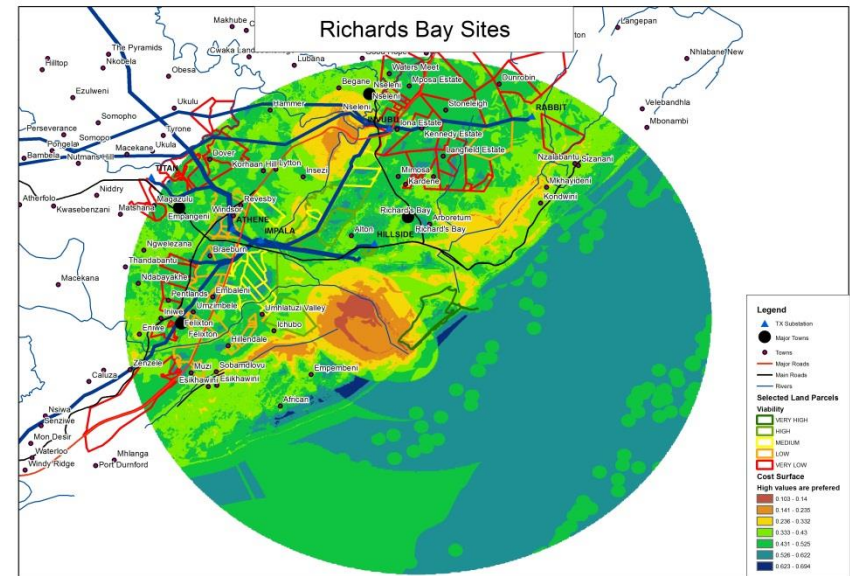
# Magalies Earth Electrode Site Selection DC





# Combined Cycle Gas Turbine Site

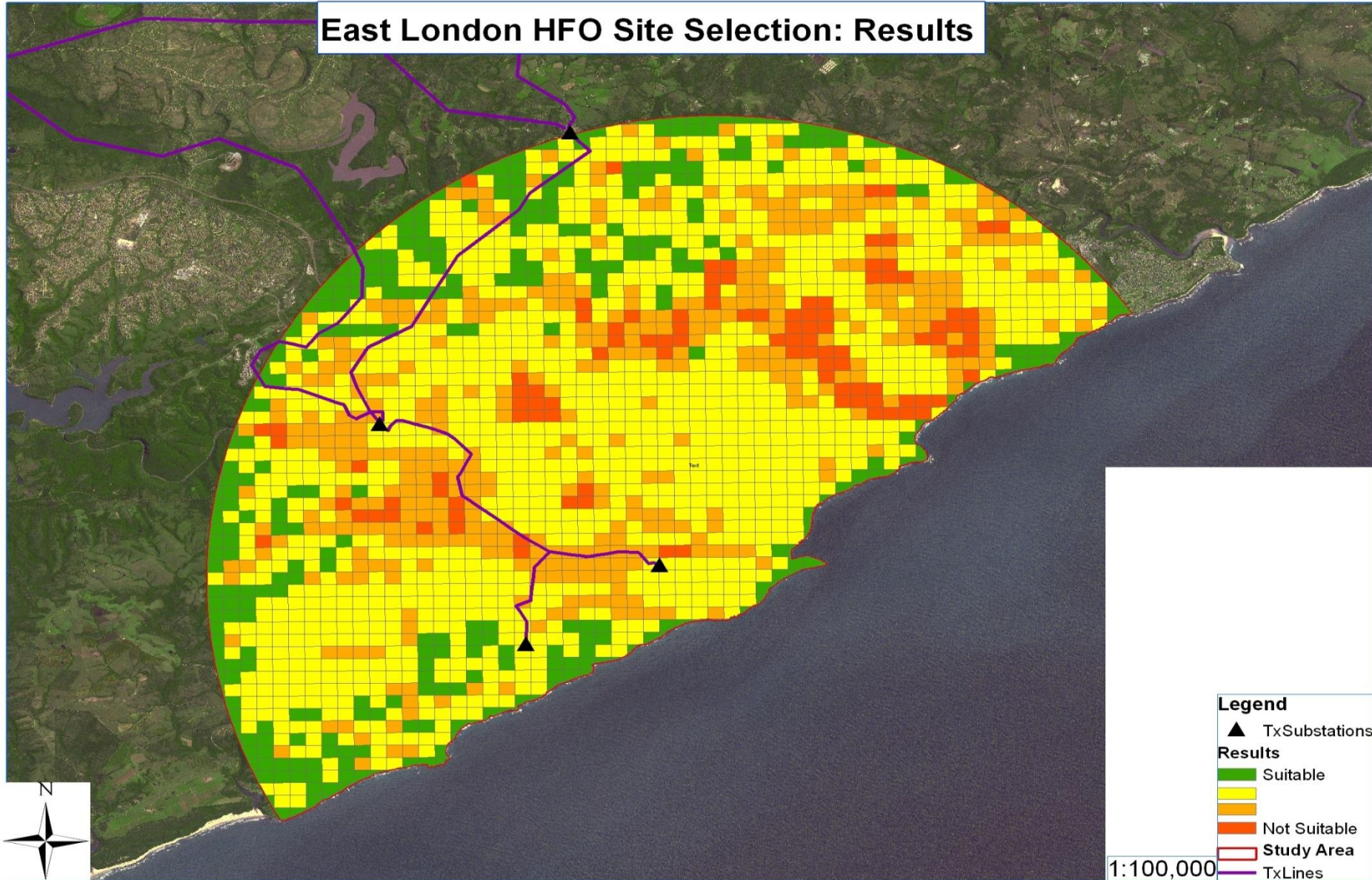
- **Objective**
  - Identify possible sites for the development of a CCGT plant of 2500 MW
- The sites selection is done 3 locations; Richards Bay, Saldanha and Coega.
- These are possible location for Liquid Natural Gas to be brought into the country.
- 10 to 15 layers make up the site selection.
- Fuzzy logic is applied to generate the final selected sites.
- All the required criteria and requirements for sites are built into a set of interlinked modules.





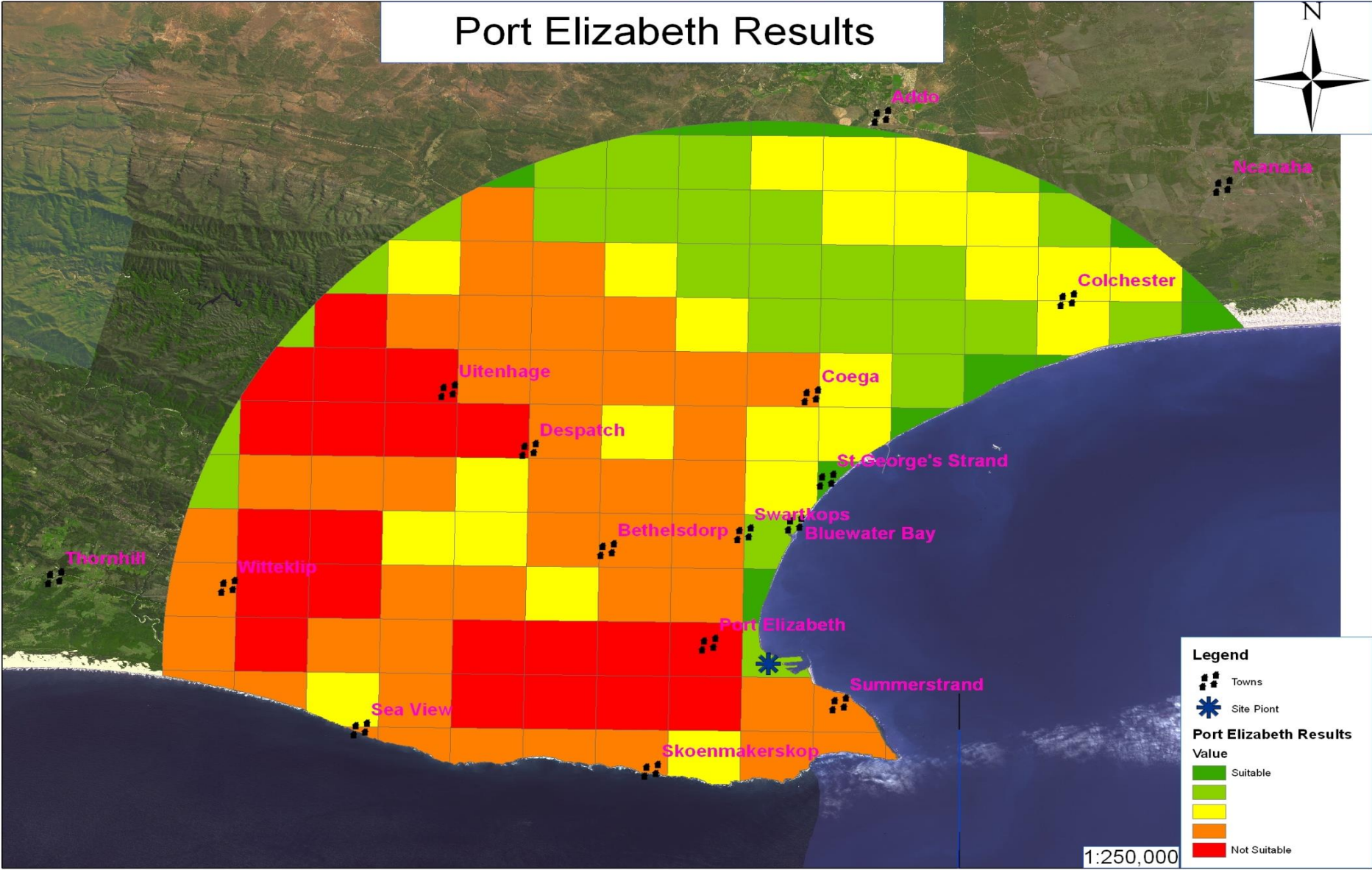
# Heavy Fuel Oil Site Selection

East London HFO Site Selection: Results





# Coastal Power Station Site Selection





# The Objective

