

## Integration of Environmental Aspects:

### The case of Project SERE

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Eskom Environmental Management,

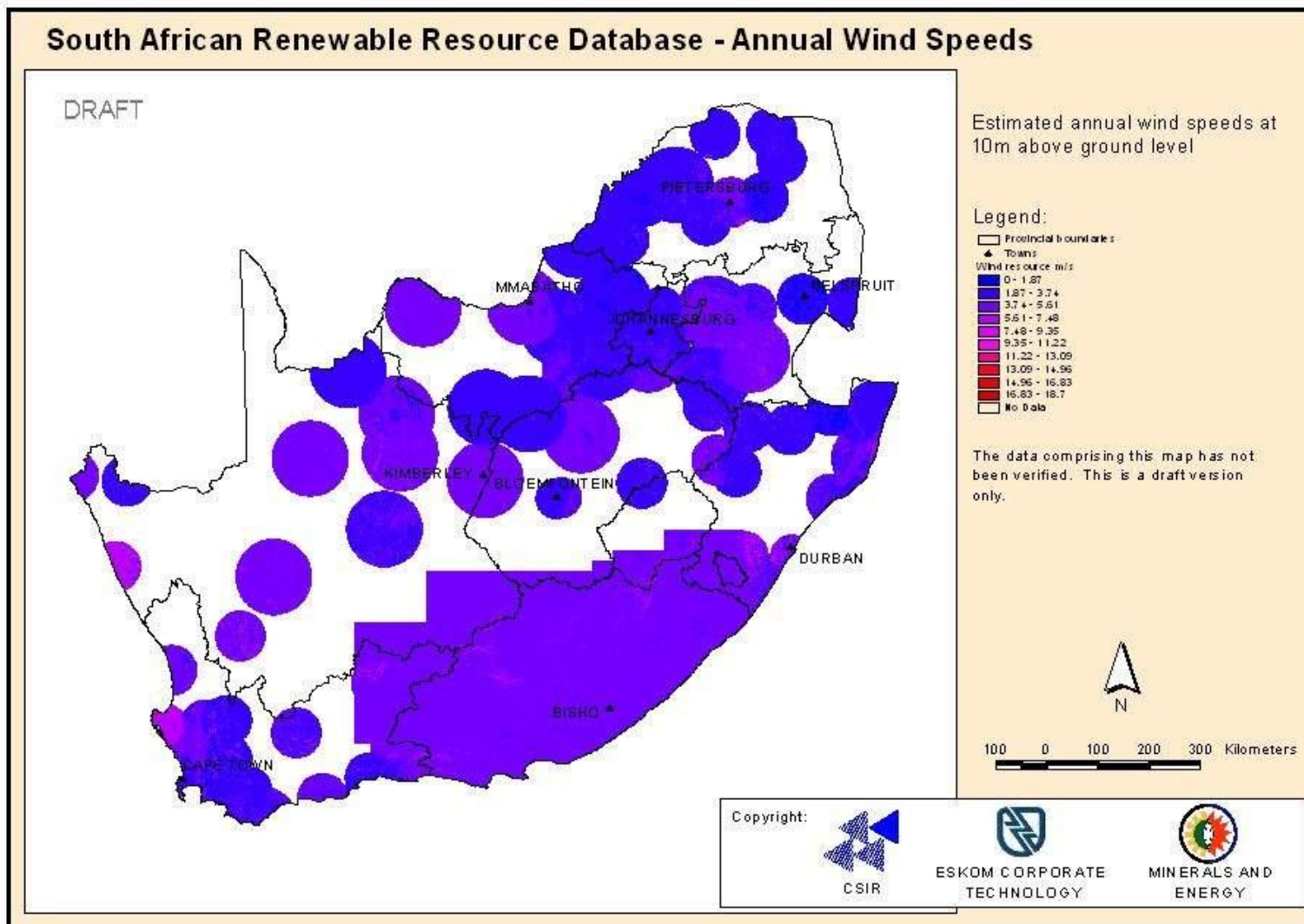
Sustainability Division



# Roadmap of the presentation

- History of the need for renewable energy
- Siting process ~ integrating environmental elements
- Applicable legislation
- Profile of the proposed wind 100 facility
- Biodiversity specific studies:
  - Avifauna impact assessment
  - Vegetation impact assessment
  - Fauna impact assessment
- Outline of the EMP

- Growing energy demand within SA = need for diversifying Eskom's energy mix and the country's targets for renewable energy
- Eskom has undertaken initiatives to establish renewable forms of electricity generation capacity
- Eskom embarked on a programme to investigate SA's sources of renewable energy and ID appropriate alternative solutions to meet electricity needs of SA
- Through this research the viability of a WEF was investigated, and potential to establish a wind energy facility at a site along the West Coast within the W cape was ID



	Regional scale criteria (Distance from)	Threshold value
1	Urban areas	600 m from urban edge
2	Residential areas (incl. rural)	400 m
3	Transport routes <ul style="list-style-type: none"> <li>• National roads</li> <li>• Local roads,</li> <li>• Provincial roads,</li> <li>• Local tourist routes,</li> <li>• Railway lines</li> </ul>	<ul style="list-style-type: none"> <li>• 3km,</li> <li>• 500m,</li> <li>• 4km,</li> <li>• 2.5km,</li> <li>• 250m</li> </ul>
4	Transmission lines: <ul style="list-style-type: none"> <li>• Major powerlines,</li> <li>• Cellphone masts,</li> <li>• Radio &amp; navigation,</li> </ul>	<ul style="list-style-type: none"> <li>• 250m</li> <li>• 500m</li> <li>• 250m</li> </ul>
5	Key infrastructure/Airports: <ul style="list-style-type: none"> <li>• Airport with primary radar,</li> <li>• Local airfield,</li> <li>• National security sites (eg Koeberg)</li> </ul>	<ul style="list-style-type: none"> <li>• 25km,</li> <li>• 2.5km,</li> <li>• 15km</li> </ul>
6	National Parks and Provincial Reserves	2km
7	Protected areas: <ul style="list-style-type: none"> <li>• Mountain catchments,</li> <li>• Protected natural environment,</li> <li>• Private nature reserves (open space zone II),</li> <li>• Heritage and cultural sites</li> </ul>	<ul style="list-style-type: none"> <li>• 500m,</li> <li>• 2km,</li> <li>• 500m,</li> <li>• 500m</li> </ul>
8	Coast and rivers: <ul style="list-style-type: none"> <li>• Distance to coastlines of undisturbed scenic values,</li> <li>• Distance to rivers,</li> <li>• Distance to 1:100 year floodline</li> </ul>	<ul style="list-style-type: none"> <li>• 3 – 4km</li> <li>• 500m</li> <li>• 200m</li> </ul>
9	Sensitive areas: <ul style="list-style-type: none"> <li>• Distance to major wetlands,</li> <li>• Distance to local wetlands,</li> <li>• Distance to bird habitats and avian flight paths where known</li> </ul>	<ul style="list-style-type: none"> <li>• 2km</li> <li>• 500m</li> <li>• 1km</li> </ul>
10	Topographical: <ul style="list-style-type: none"> <li>• Elevation and slopes</li> <li>• Distance from ridge lines</li> </ul>	<ul style="list-style-type: none"> <li>• 1:4 slopes, and high mountain features</li> <li>• 500m</li> </ul>
11	Vegetation	

## BUSINESS CASE FOR PROJECT WEF 1 – 100MW West Coast Wind

### GIS MAP INTEGRATIONS

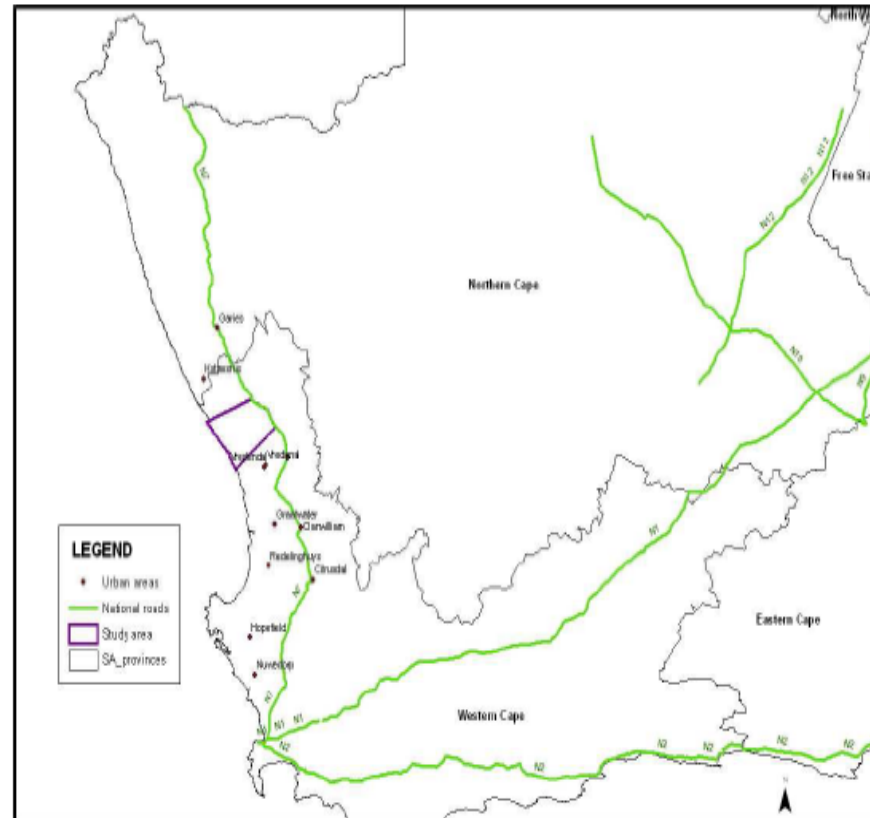
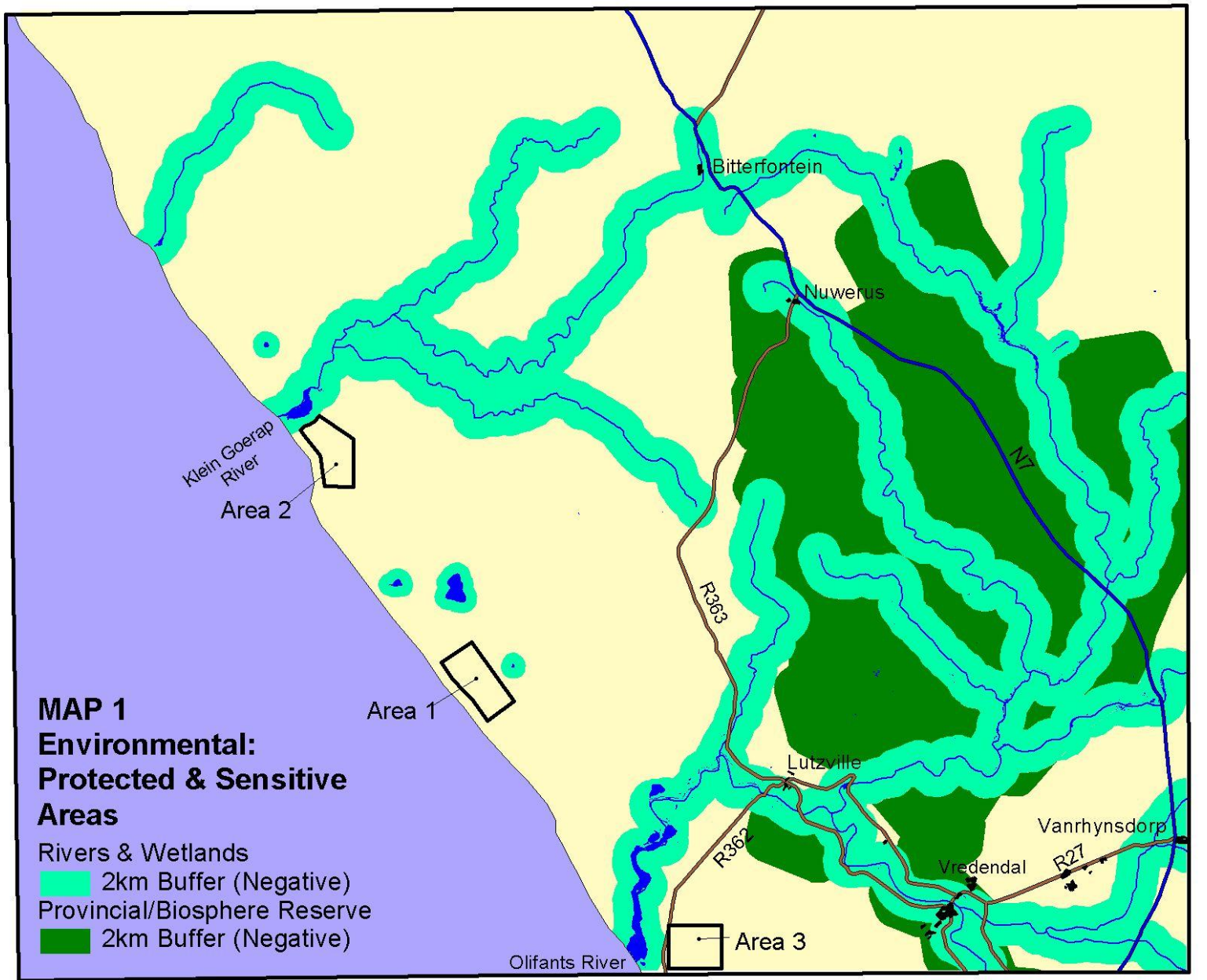


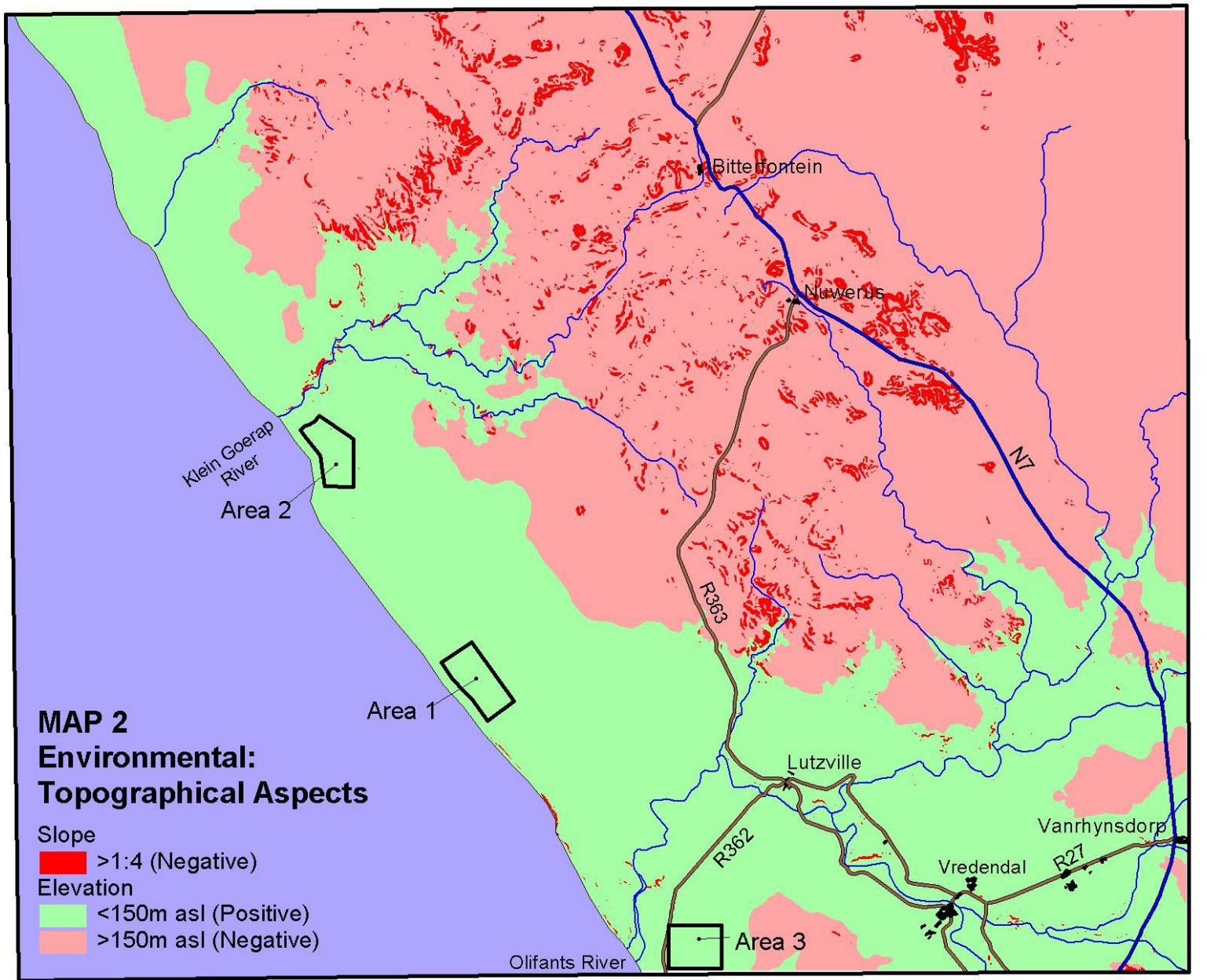
Figure 2.1: Location of the study area within South Africa

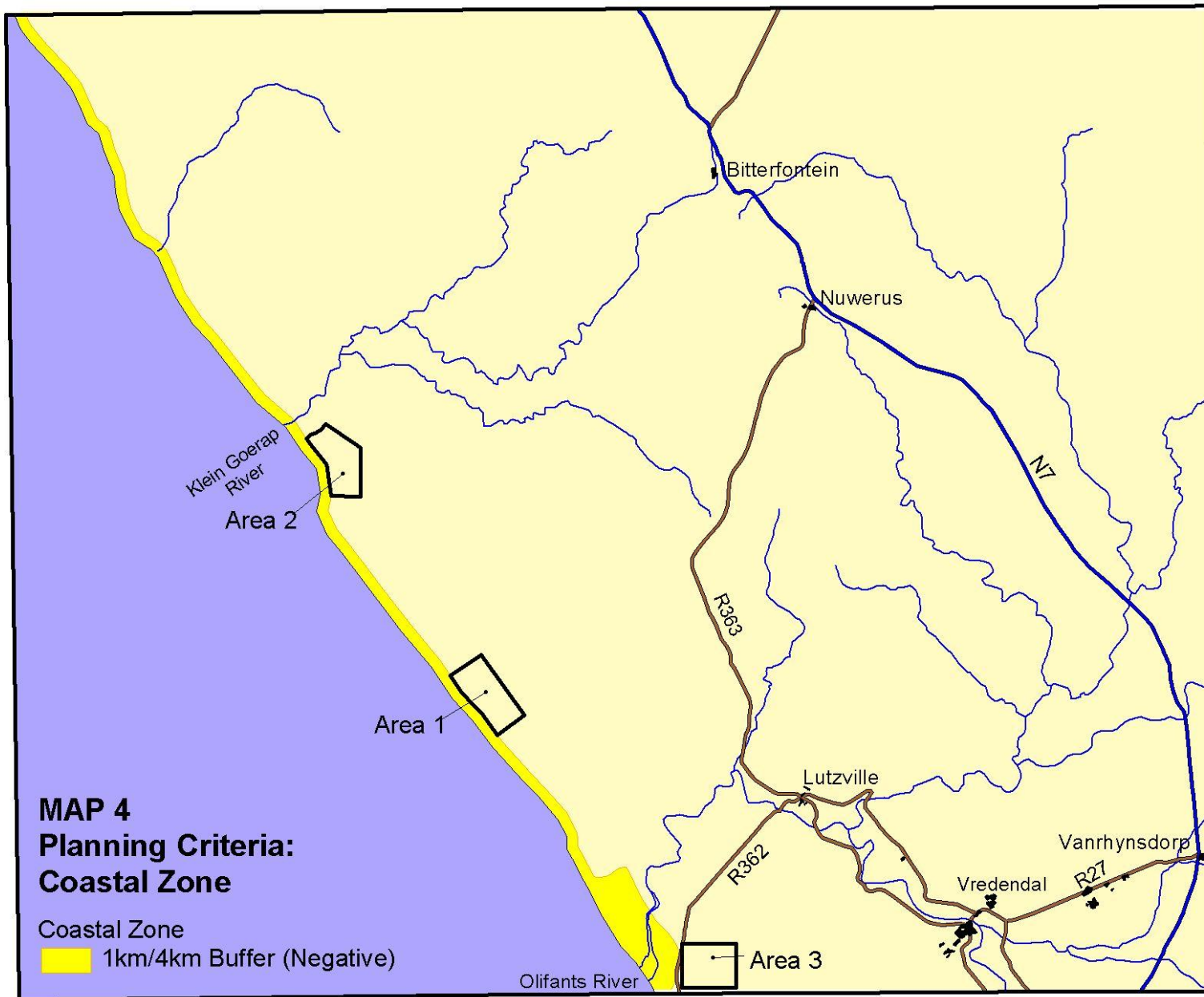
# Methodology for the Regional Determination of Acceptable Areas of Suitability for Wind Energy Development

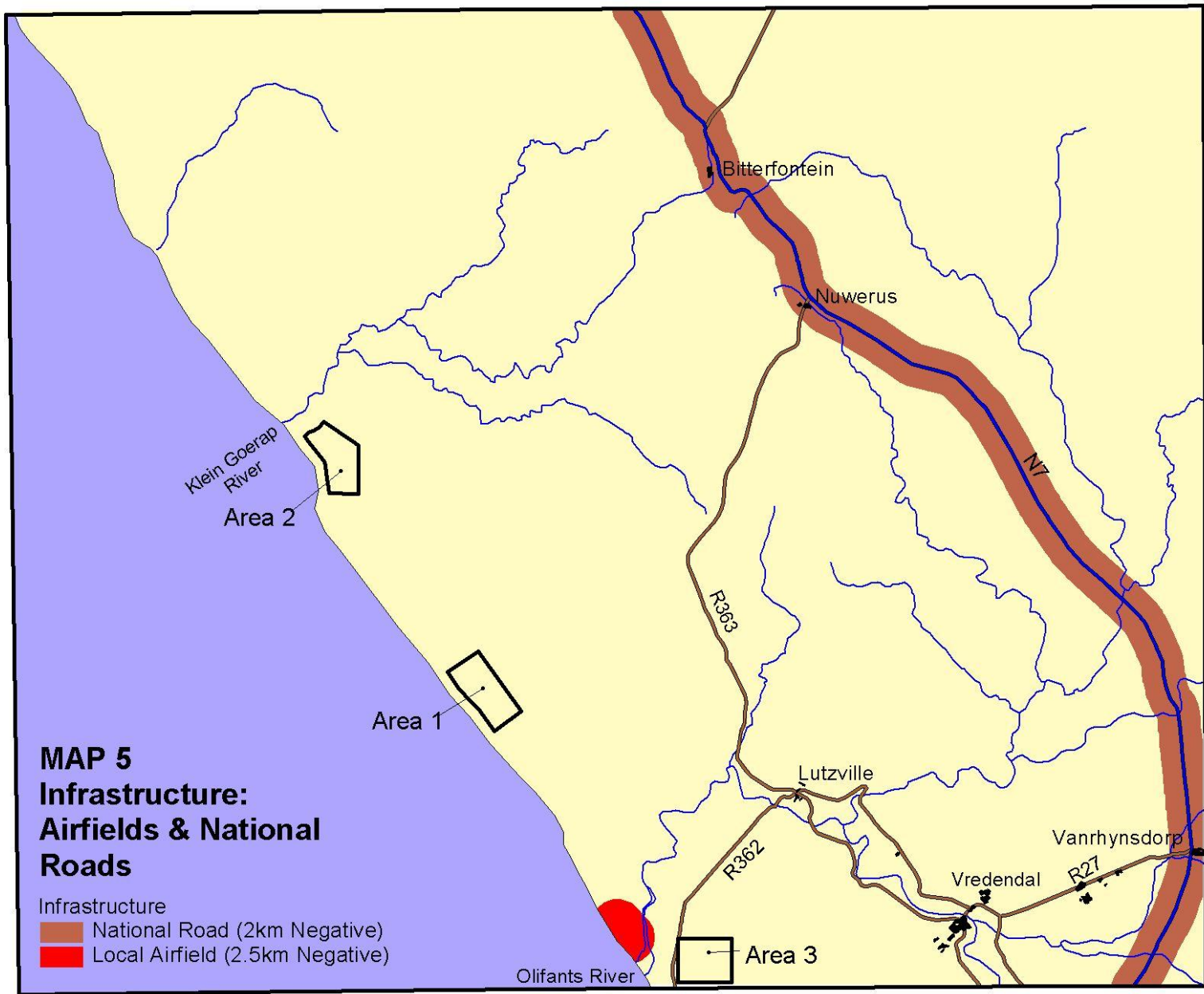












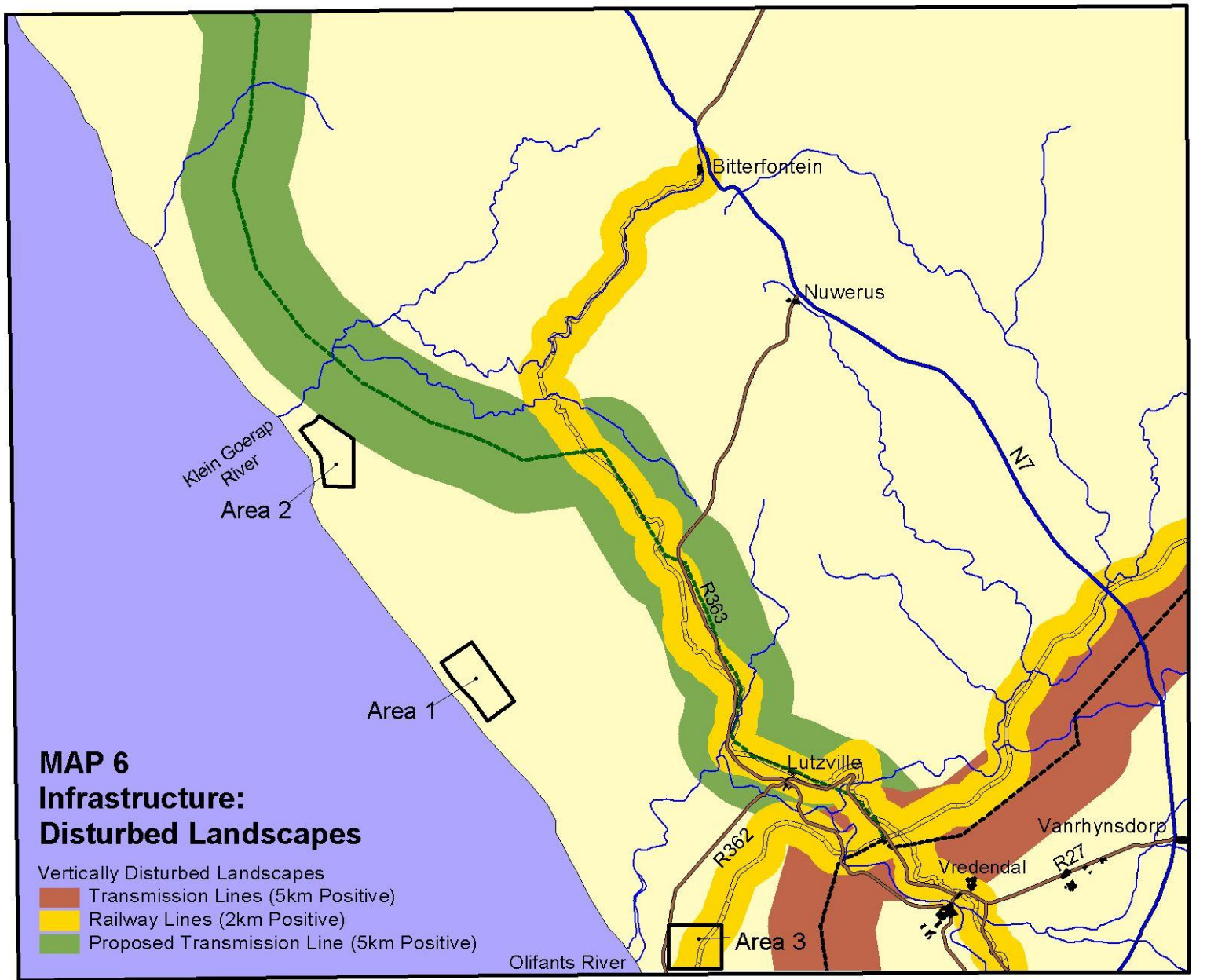
**MAP 5**  
**Infrastructure:**  
**Airfields & National**  
**Roads**

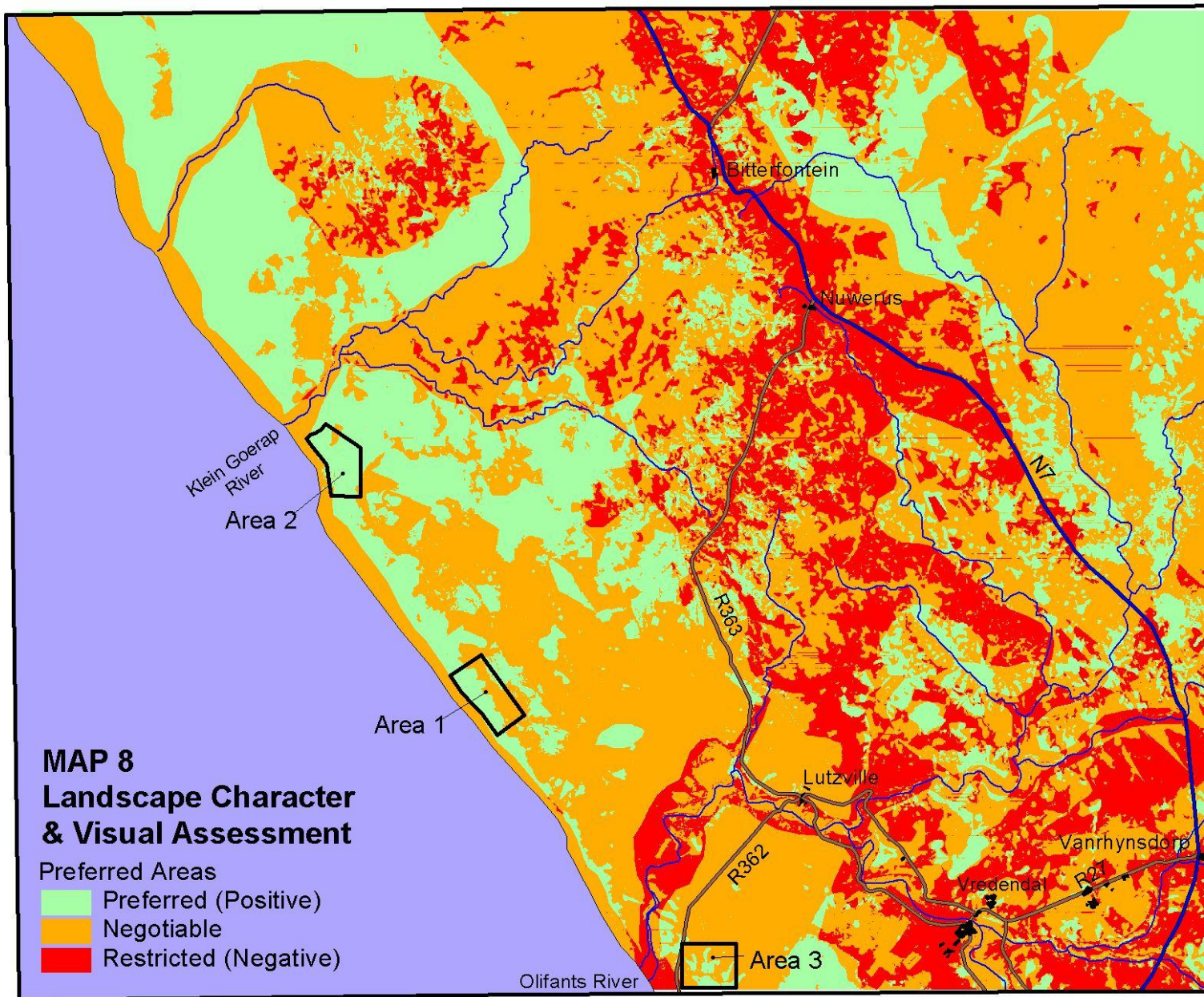
Infrastructure

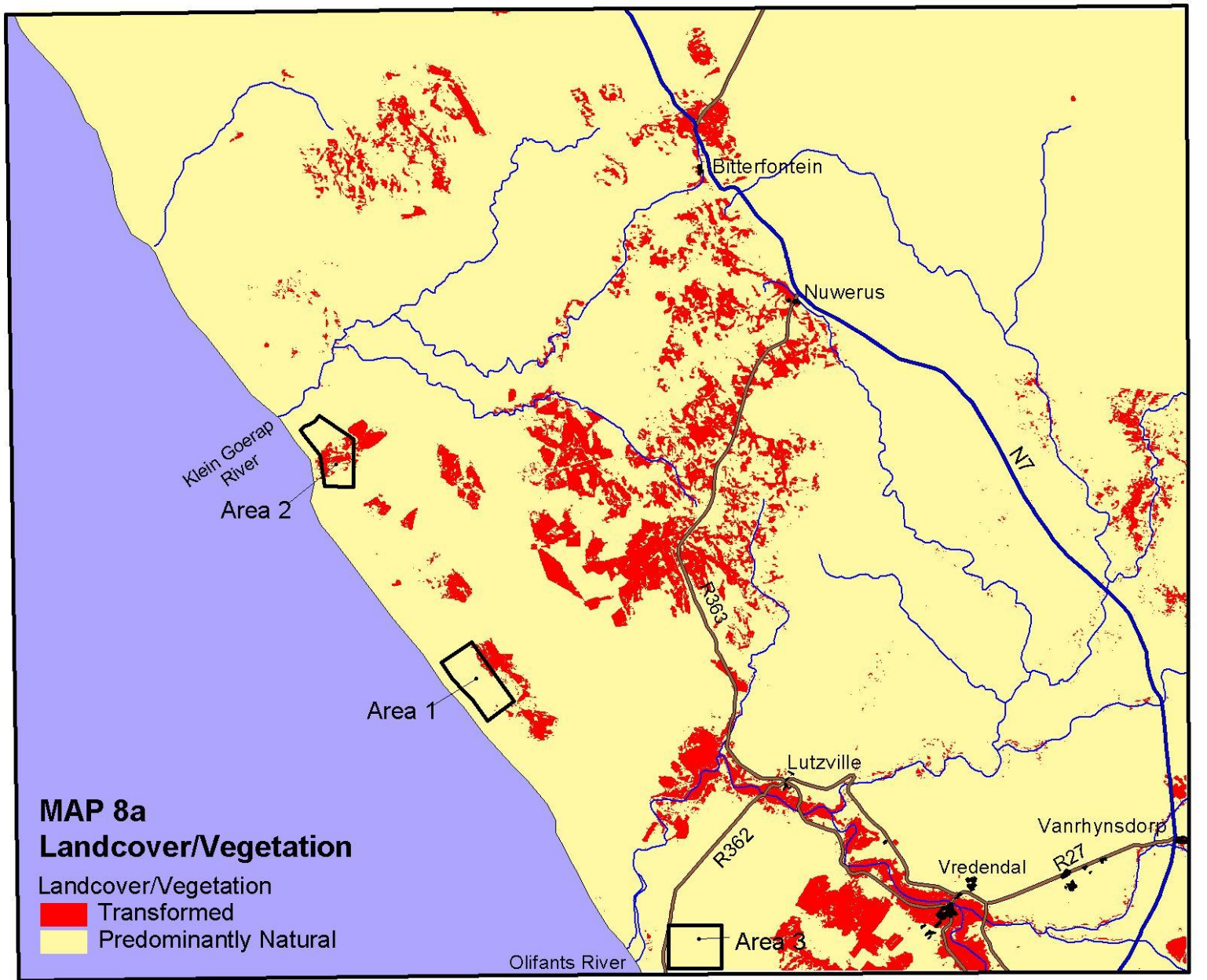
 National Road (2km Negative)

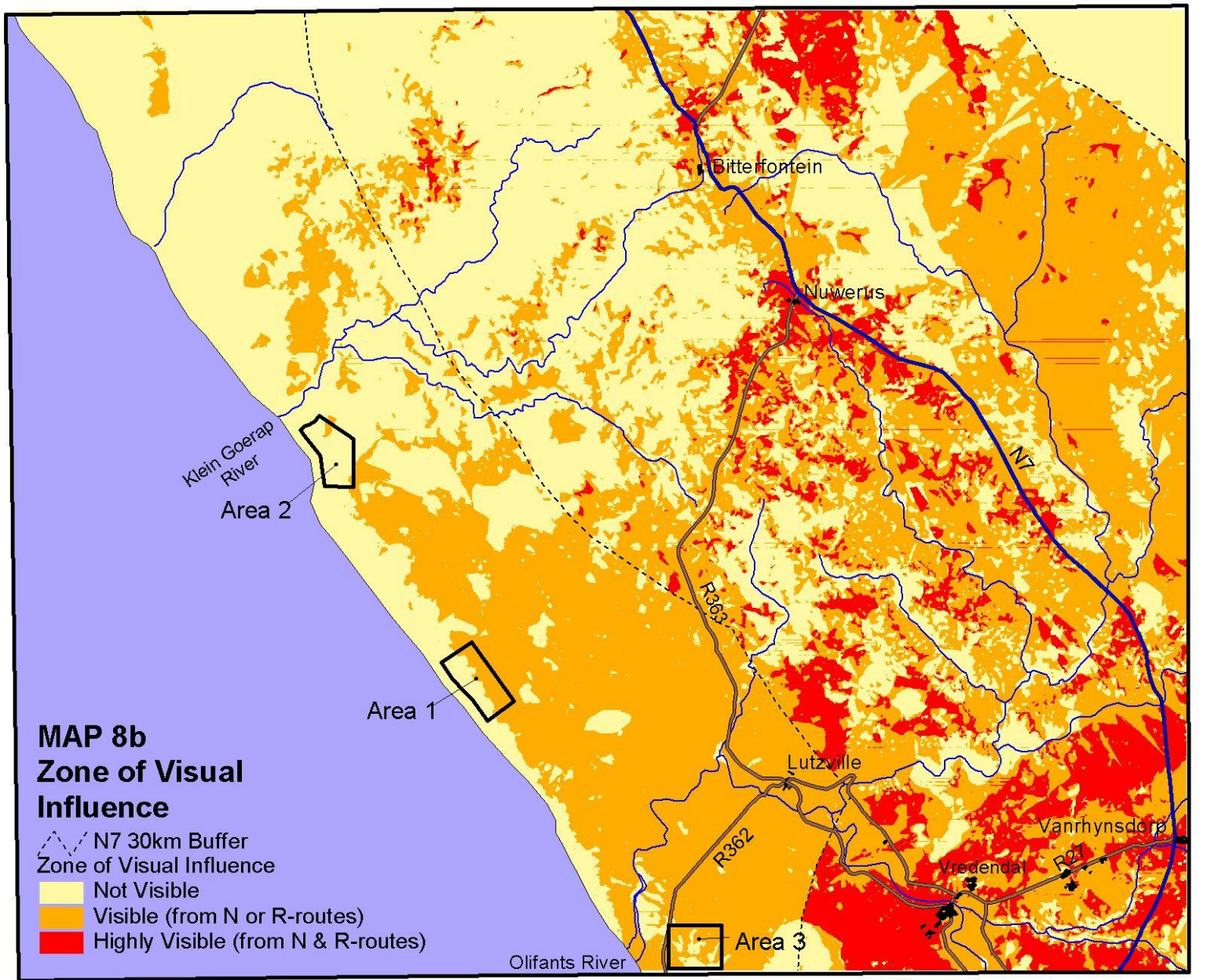
 Local Airfield (2.5km Negative)












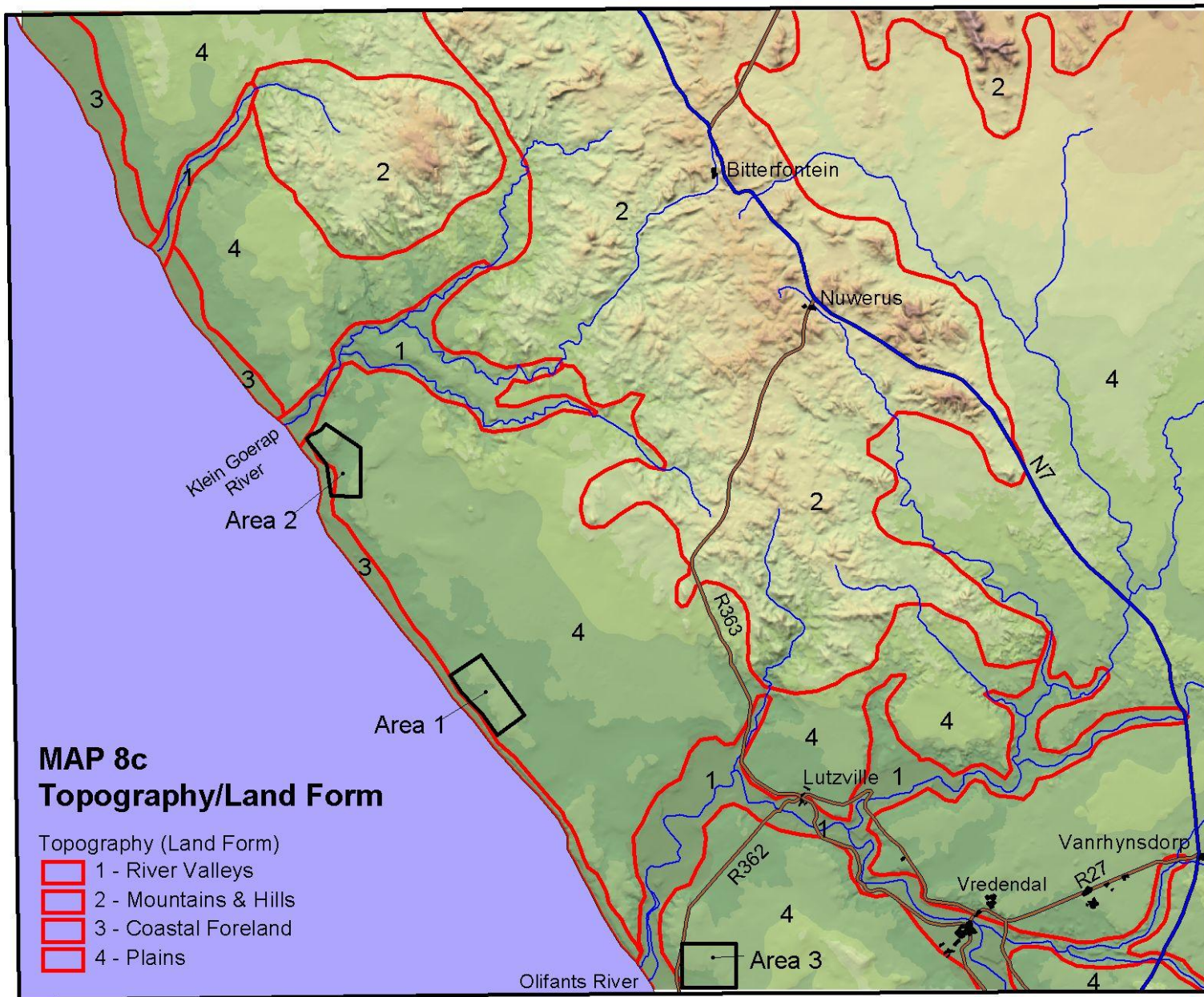




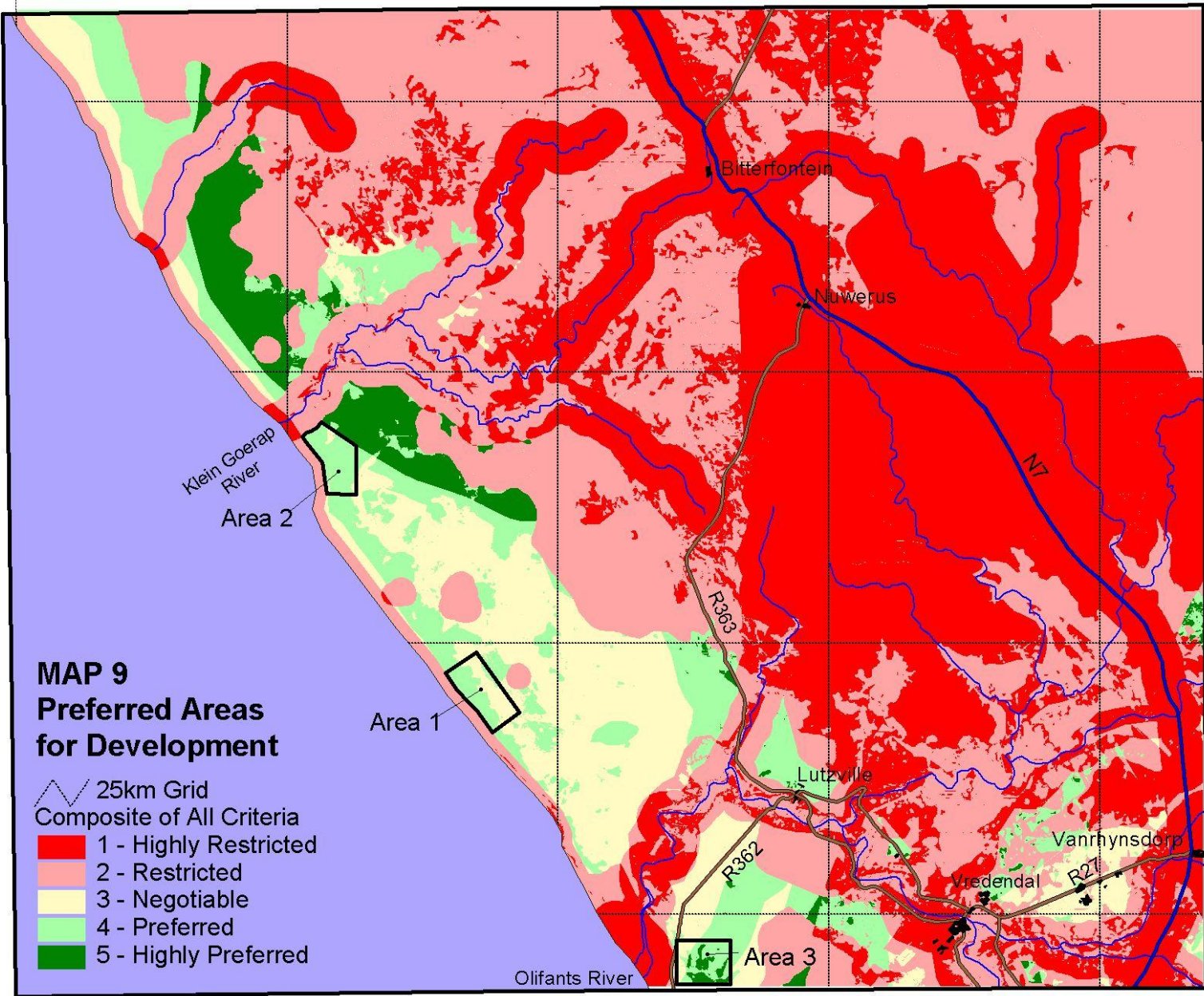
**MAP 8b**  
**Zone of Visual Influence**

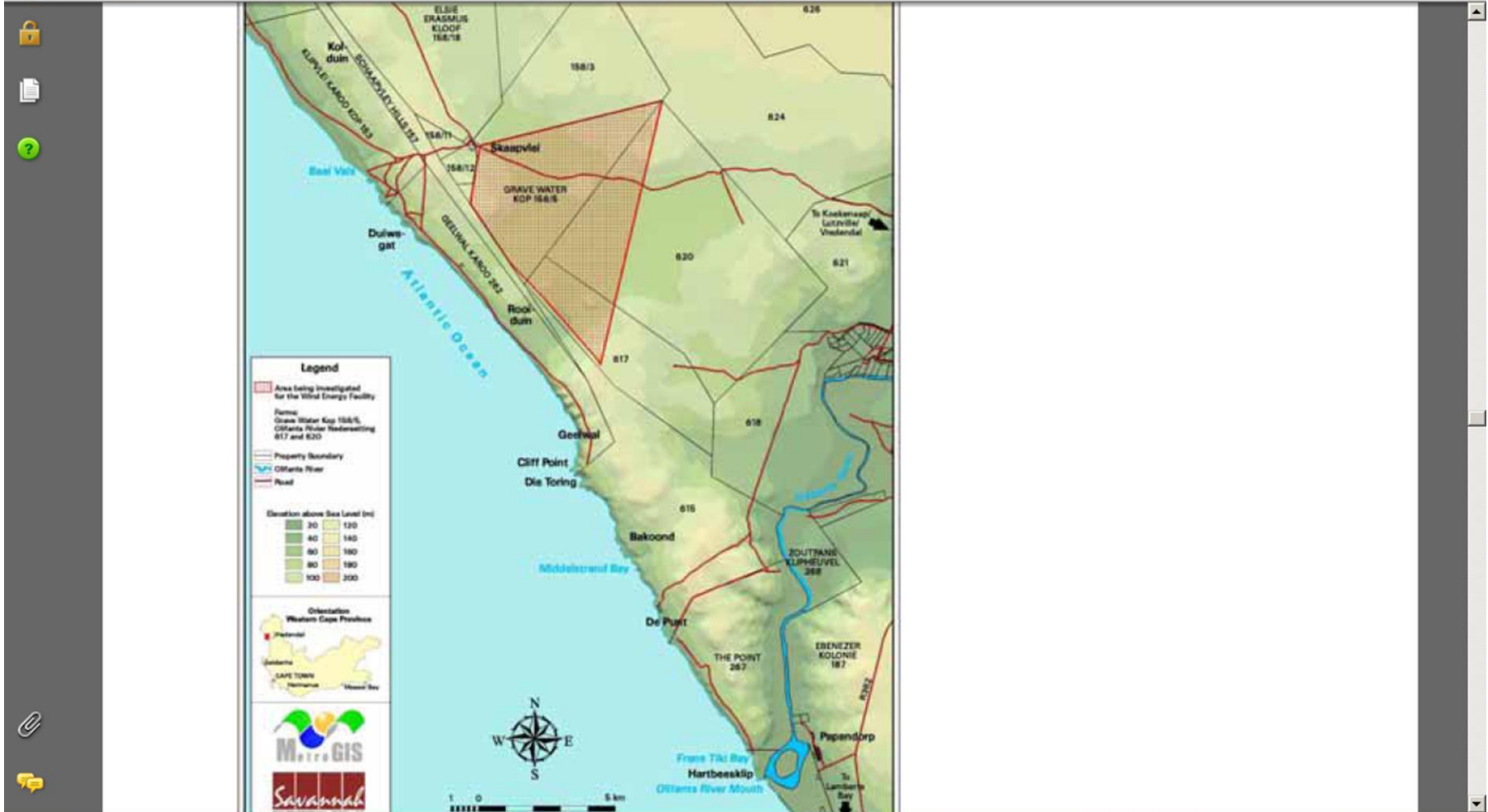
-  N7 30km Buffer
-  Zone of Visual Influence
-  Not Visible
-  Visible (from N or R-routes)
-  Highly Visible (from N & R-routes)

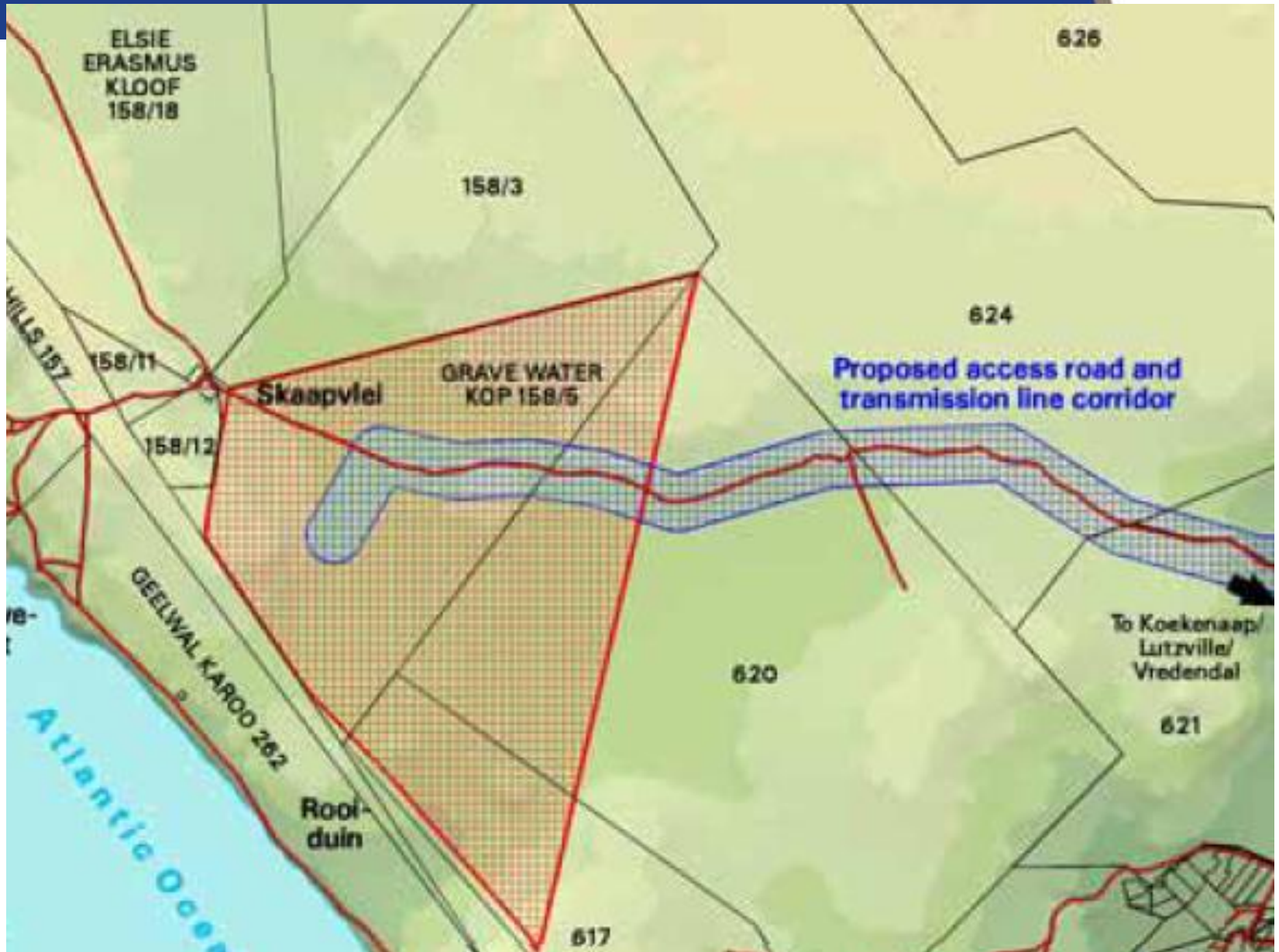
10 0 20km

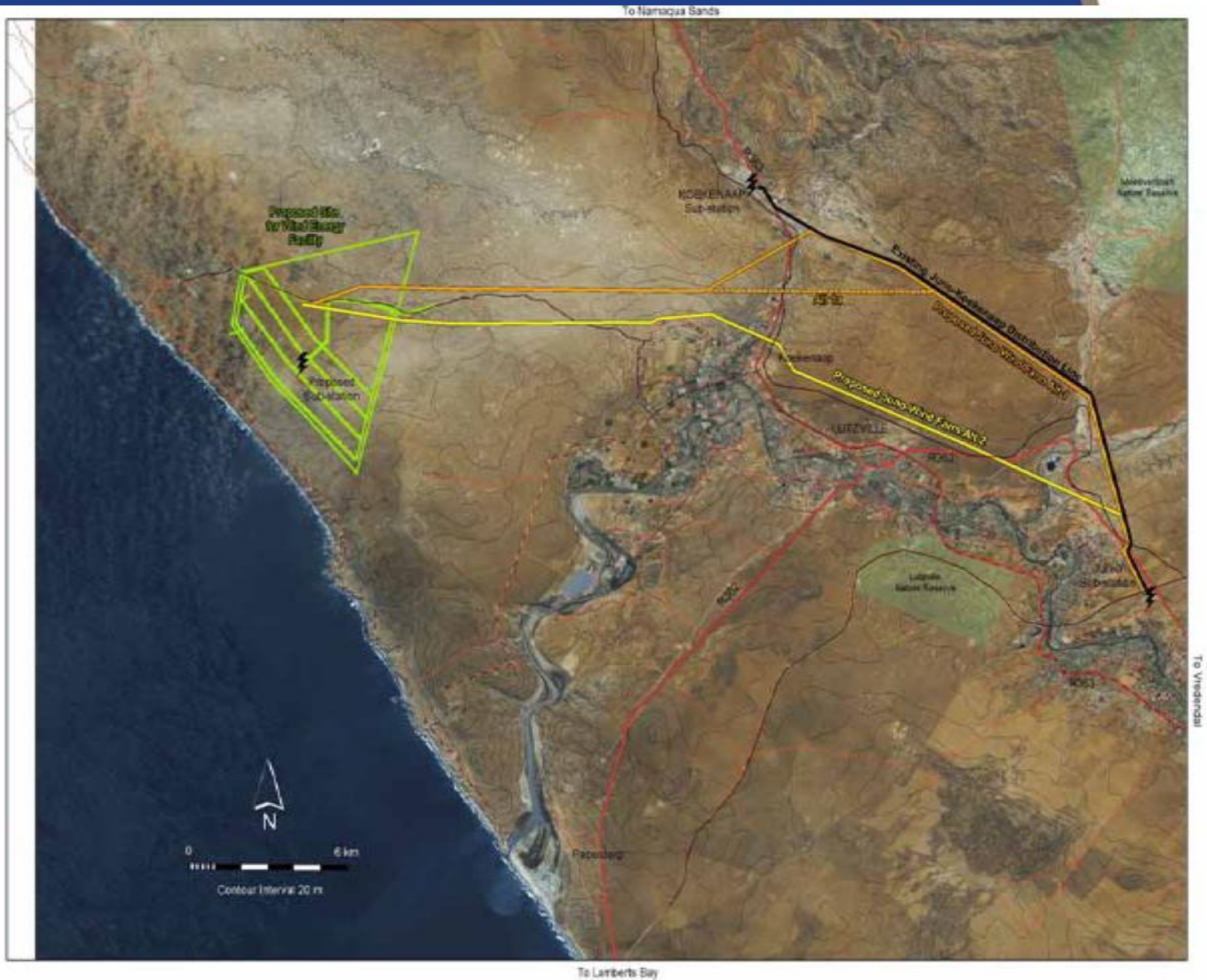












# “Environment” defined (NEMA)

The surroundings within, which humans exist and that are made up of:

(1) The land, water and atmosphere of the earth;

(2) Micro-organisms, **plant and animal life**;

Any part or combination of (1) and (2) and the interrelationships among and between them; and the physical, chemical and aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being (NEMA, Act 107 of 1998).

Environment (S24).

Everyone has the right:

- (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -
  - (i) prevent pollution and ecological degradation;
  - (ii) promote **conservation**; and
  - (iii) **secure ecologically sustainable** development and use of natural resources while promoting justifiable economic and social development.

To provide for the effective protection and controlled utilisation of the environment and for matters incidental thereto;

- competent authority may by notice in the Official Gazette concerned declare any area defined by him, to **be a protected natural environment** and may allocate a name to such area,
- Provided that such protected natural environment may only be declared- (a) if in the opinion of the competent authority there are adequate grounds to presume that the declaration will substantially **promote the preservation of specific ecological processes, natural systems, natural beauty or species of indigenous wildlife or the preservation of biotic diversity in general**
- Listed activities and EIAs ~ 1997 (GN 1182 and GN 1183)

# National Environmental Management Act, 107 of 1998

- Principles:
  - development must be socially, environmentally and economically sustainable
  - Sustainable development requires the consideration of all relevant factors including the following: (i) that the **disturbance of ecosystems and loss of biological diversity are avoided**, or, where they cannot be altogether avoided, are minimised and remedied
  - environmental management must be integrated, acknowledging interrelatedness of environmental elements,
- Section 28, Duty of Care and remediation of environmental damage ~ Every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring;
- Identified certain activities as requiring authorisation from a Competent Authority; and provided regulations ~ EIAs.



# National Environmental Management: Biodiversity Act, 10 of 2004

To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bio-prospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.

- The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection
- The Minister may, by notice in the Gazette, identify any process or activity in a listed ecosystem as a threatening process.
- The Minister may, by notice in the Gazette, publish a list of—
  - (a) critically endangered species, endangered species, vulnerable species and protected species...

# National Environmental Management Waste Act, 58 of 2008

- Reforms law on waste management by making provision for measures for prevention of pollution and ecological degradation;
- Protects health, well-being and environment through providing reasonable measures for:
  - Minimising consumption of natural resources;
  - Avoid and minimise generation of waste;
  - Reduce, re-use, recycle and recovery of waste;
  - Treating and safe disposal of waste is last resort;
  - **Prevention of pollution and ecological degradation;**
  - Promote and ensures effective delivery of waste services;
  - Achieve integrated waste management reporting and planning;
- Ensures people are aware of impact of waste on their health, well-being and environment (and gives effect to Bill of Rights on environment)
- Proposes list of activities requiring a waste management licence ([GN R718](#))

Part 4 deals with pollution prevention, and in particular the situation where pollution of a water resource occurs or might occur as a result of activities on land ~ Duty of Care.

- The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources;
- Provides processes to be followed in an emergency incident which may impact the environment

# Profile of SERE

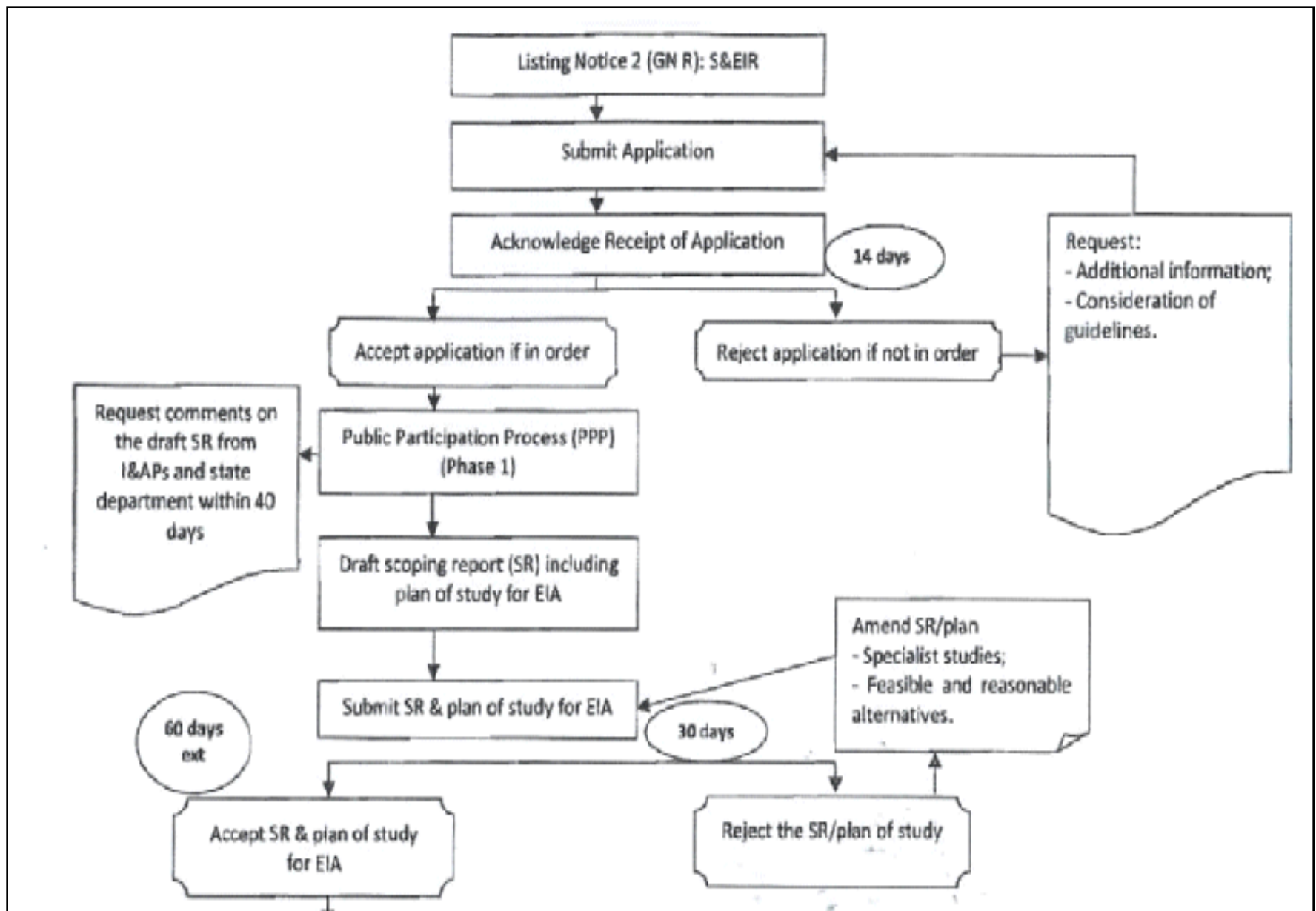
- A **Wind Energy Facility** including up to 100 wind turbine units, a substation, underground electrical cabling between turbines and the substation, internal access roads and an office building and visitors centre at the facility entrance.
- Overhead **power lines** (132 kV distribution lines) from the wind farm substation feeding into the electricity network/grid at the Juno transmission substation (near Vredendal).
- Improvement to the riding surface of the existing Divisional Road 2225 (known as Skaapvlei road) to provide access to the site (i.e. act as a **haul road** during the construction phase) from the R363 main tarred road at Koekenaap



- Eskom Appointed Savannah Environmental as the independent EAP to undertake the EIA
- The EIA process was undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).
- Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed wind energy facility and associated infrastructure.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

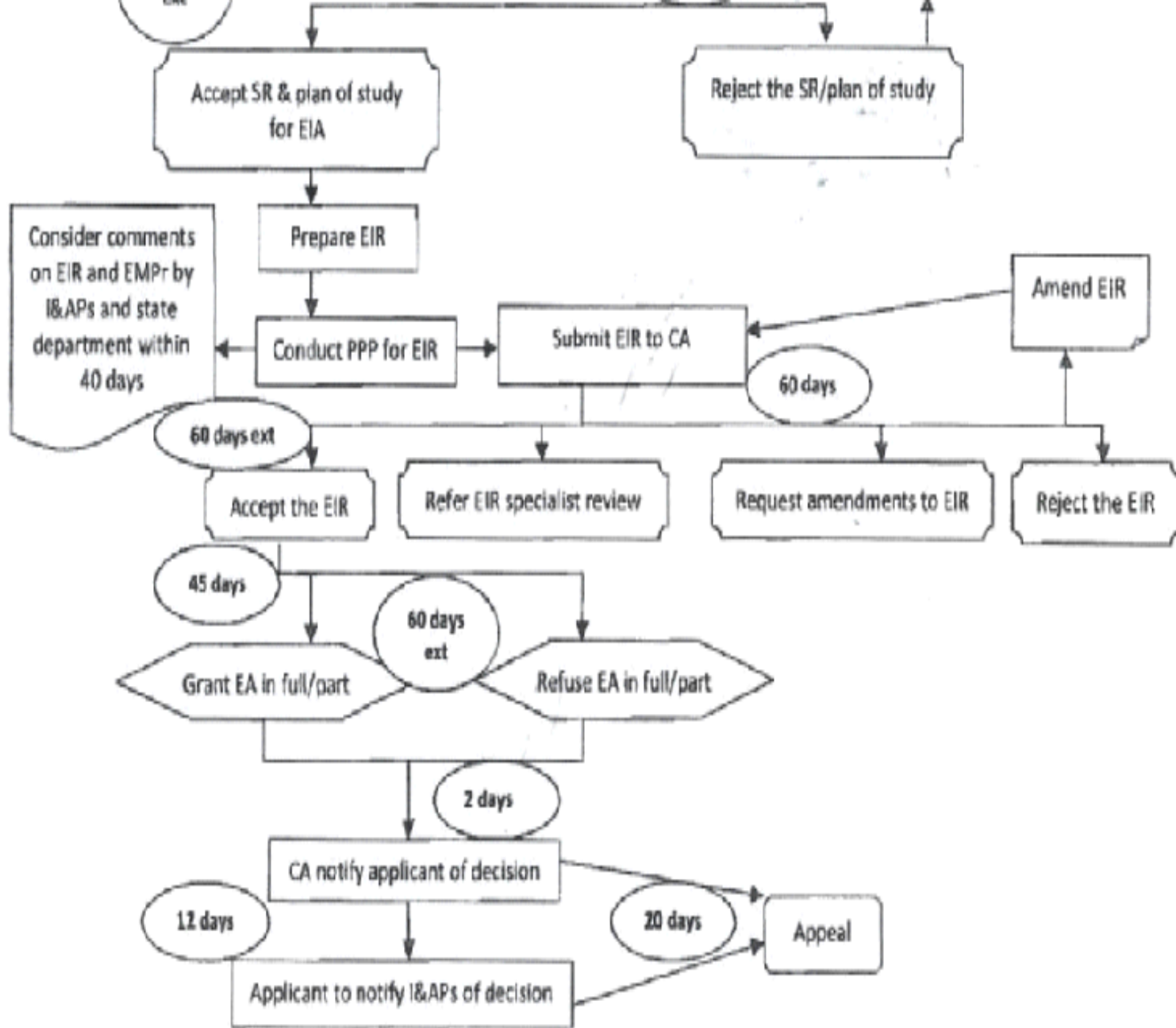
- Submit application form ~ notify landowner/s (letters, e-mail, mail drops);
- Undertake Public Participation Process (PPP) (30 days) ~ Background Information Document (BID), media advertisements, individualised letters, notice boards, open register of I&APs > organs of state;
- Receive input from I&APs for Scoping report: identifying relevant aspects/issues; potential environmental impacts; alternatives (project/process/site/layout/no-go)
- Prepare Scoping Report & Plan of Study for EIA;
- Avail reports to public for review (40 days) (*60 days for DWA for waste activities*) ~ public meetings, Focus Group Meetings, 1-on-1;
- Finalise and submit Final Scoping Report to DEA for review and acceptance;
- Authorities acceptance of FSR and PoS EIA

# Full EIA process ~ Scoping phase



- Undertake specialist studies (ecology, visual, archaeology, noise, groundwater, surface water, geotechnical, etc) as per PoS EIA;
- Compile Draft Environmental Impact Report (EIR) and Draft Environmental Management Programme/Plan (EMP);
- Avail report for Public Participation Process (40 days)
- Finalise EIR and EMP and submit to authorities for decision making;
- Authorities granted Environmental Authorisation
- Registered Interested & Affected Parties (I&APs) were notified;
- No appeals were received;
- Amendments on EA ~ hub height.

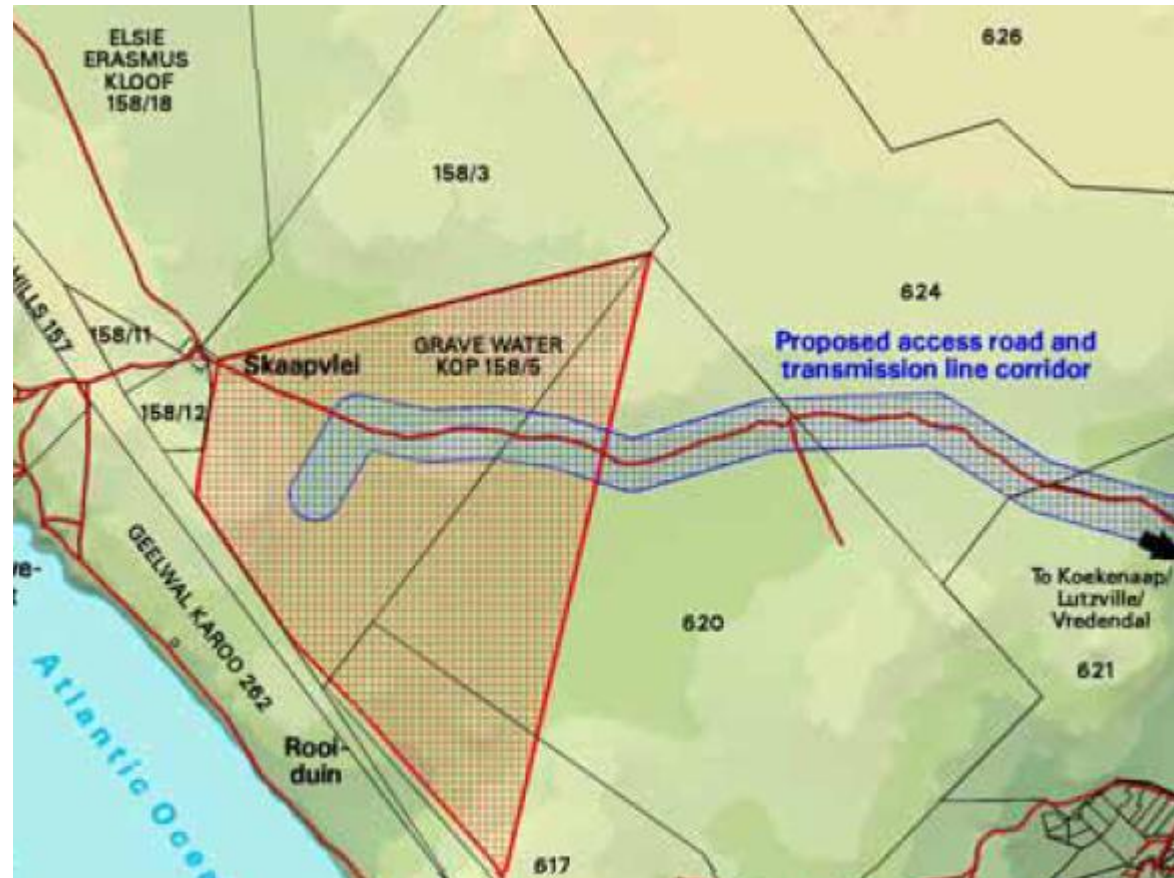




# Potential Impacts investigated

- Identification and assessment of the following potential impacts associated with the construction and operation of the proposed WEF , and associated infrastructure:

- **Vegetation**
- **Terrestrial Fauna**
- **Avifauna**
- Geomorphology
- Heritage
- Visual
- Noise
- Tourism
- Social



# Avifaunal impact assessment

Andrew Jenkins, Endangered Wildlife Trust (EWT)

- Avifauna impact assessment TOR:
  - A detailed field investigation for the preferred site (to identify any significant impacts on avifauna).
  - Identified alternative alignments for the Dx line and access road to the site
  - General recommendations for mitigation of significant impacts
- Literature survey conducted, followed by site visit
  - preliminary site visit to the general study area March 2007, focused assessment in October 2007 in which;
    - avian micro habitats present on site were recorded;
    - key areas of habitat were surveyed for priority bird species;
    - alternative routes for power line feeding the site were compared)

Impact	Comments	Mitigation
Disturbance to resident birds during construction	localised and temporary, and relative abundance of species ID (therefore negligible impact)	Survey construction area for larger priority species nests, and work around any such nests
Disturbance during maintenance and operational (movement, appearance or noise during operational phase)	Longer term	<p>Consider all located NB nests in pre-construction survey during planning of routine maintenance</p> <p>Collection of data on the scale and rates of passage of commuting species</p>
Habitat destruction (considered negligible)	<p>Small area will be completely destroyed/lost</p> <p>Large quantity will be degraded/damaged</p>	<p>Rehabilitate damaged vegetation</p> <p>Inspect specific sites of each turbine and auxiliary infrastructure to avoid affecting micro habitats</p>
Collision with turbines (considered most significant)	Affect aggregations, individuals or loose flocks which may travel through impact zone and/or at night and/or during poor weather conditions	<p>Consider cumulative impact over time</p> <p>The relative abundance of these species in general area of the facility renders impact negligible</p> <p>If impact is detected from monitoring (pre and post construction) mitigation could include:</p> <ul style="list-style-type: none"> <li>•Painting blades</li> <li>•Temporarily or permanently shutting down selected turbines</li> <li>•Shutting down entire facility at certain times or in certain weather conditions</li> </ul>

# Avifauna Impact Assessment

Impact	Comments	Mitigation
Collision with 132kV power line to Juno substation	NB species: Ludwigs Bustard and secretary bird	Mark power lines that cross open/relatively flat areas / watercourses with marking device, Sections of power line should be surveyed for casualties
Electrocution on the 132kV power line	Most susceptible; Raptor fauna	Consider mono-pole pylon structures, Survey line sections for electrocution casualties – insert bird guards
Habitat destruction/disturbance during construction and maintenance of 132kV line		Carry out activities according to accepted environmental best practice, Keep temporal and spatial footprint to a minimum, Use existing roads where possible, Take care near river crossings, Check key areas for nests of threatened species
Impact from birds to quality of supply on 132kV line		Consider tower designs poorly suited for nesting substrates or for perching areas

- Determine resident bird densities (pre and post construction)
- Document patterns of bird activity and movements (pre and post)
- Monitor bird activity patterns and movement in relation to weather conditions, time of day and season for a calendar year after commissioning
- Register and document circumstances surrounding avian collisions with turbines for a calendar year
- Purpose:
  - Inform and improve mitigation
  - Establish a precedent and template for research and monitoring

- Proposed WEF will have limited negative impacts on avi-fauna
- Threat of collision with turbine blades considered most concerning
- The proposed WEF is not positioned overly close to any known avian fly-ways and does not impose on a bird-rich environment
- NB to exploit opportunity to learn about birds and wind farms in the SA environment
- NB to establish a pre and post monitoring programme, and longer term survey of bird movements to inform and refine post-construction mitigation of impacts



# Terrestrial Vegetation Assessment:

Nick Helme, Botanical Surveys

- Undertook a site visit (ground-truthed)
- Conducted literature review

ToR: \* Describe broad ecological characteristics of the sites and surrounds

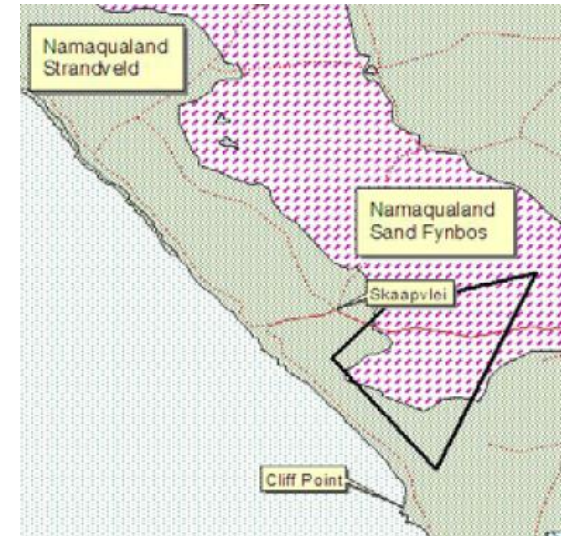
- In terms of: biodiversity pattern, ID/describe
  - Community and ecosystem level
    - The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography; the types of plant communities that occur in the vicinity of the site; threatened or vulnerable ecosystems
  - Species level
    - RDB species and the viability of and estimated population size of RDB species
- The process, ID/describe
  - The key ecological likelihood of other RDB species, or species of conservation concern, occurring in the vicinity

TOR continued...

- Other pattern issues
  - Any significant landscape features or rare of NB vegetation; the extent of alien plant cover of the site and source of alien plant; the condition of the site in terms of current or previous land uses
- Biodiversity drivers on site
- Any mapped spatial component of an ecological process that may occur at the site or vicinity
- Any possible changes in key processes
- What is the significance of the potential impact of the project with and without mitigation
- Recommended actions that should be take to prevent or mitigate impacts
- Limitations and assumptions

# Vegetation Assessment

- The study area falls within the Namaqualand coastal region of the Cape Floristic Region
- Two distinct vegetation types occur :  
  
Namaqualand Strandveld (Succulent Karoo biome) &  
  
Namaqualand Sand Fynbos (Fynbos biome)
- Most of the Strandveld portions are deemed to be of Medium botanical sensitivity, with the Sand Fynbos areas, clay areas, seasonal pans and rocky outcrops being of Medium to High sensitivity.
- Overall the impact of the proposed WEF on the vegetation on site is likely to have a Medium local and Low regional impact.
- The primary negative impacts are direct, permanent loss of natural vegetation (~30ha to a worst case of 80ha) in development footprints, and direct, long term loss of natural vegetation (a further ~30ha to a worst case of 80ha) in areas that will be disturbed by heavy construction machinery, temporary dumping, etc. Most of these impacts cannot be avoided or mitigated in any significant way.



# Vegetation Assessment ~ recommendations

- Avoid high local site sensitive areas
- Plan search and rescue and translocation programme
- Avoid identified sensitive portions potentially affected by proposed 132 kV powerlines
- Keep roads and turbine linkages to a minimum
- Coincide construction to dry season dormancy period (Nov-April)
- Remove livestock from area and manage as a conservation area – do not allow hunting
- Plan to manage natural sites of the area as conservation sites
- Ongoing alien plant vegetation monitoring and removal
- Ongoing erosion monitoring and removal
- Fence off construction development footprints
- Close up excavations within a week
- No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas.
- Employ ECO

# Terrestrial Fauna Assessment

P Mouton, University of Stellenbosch

- Conclusions were mainly based on species that potentially could occur on the sites as deduced from the scientific literature and previous surveys in the same habitat types in the same general area
- The study focused on vertebrates, but with cognition of invertebrate species and assemblages of conservation concern.
- Baseline descriptions of the fauna of the general area were given, placing the area in a regional and a national context.
- Species of special concern were highlighted.

## Main impacts ID:

- Direct Mortality – Several species will not be able to flee from the area that will be under construction of the wind energy facility, access road or transmission line and could suffer direct mortality. This includes slow moving species or species predisposed to shelter, such as reptiles, amphibians, and small mammals. Fossorial species will not be able to flee the area.
- Loss of faunal habitats – During construction, a loss of faunal habitat will take place that may impact on terrestrial faunal species.
- Increased road kill rate – The construction of the access road will increase the risk of mortality to terrestrial faunal species caused by vehicles.
- Barrier effect of roads and fencing – The construction of the road and various fences associated with the project will impact on the ability of faunal species to pass through or over the barriers. Small invertebrates and reptiles will suffer most. The effect is most likely to be felt during the operational phase.
- Bat mortality – Bats in the area may suffer collisions with the blades of turbine



## Impact Statement:

- All impacts have been rated as low significance, except habitat destruction which has been rated as medium significance
- If a serious effort can be made to restrict habitat destruction on the site, the significance of the impact could probably be lowered.
- The two transmission line alternatives (including sub-alternatives) do not differ in any significant way as far as potential impact on terrestrial fauna is concerned.

## Recommendations:

- Prior to construction and site clearing beginning, the area should be searched for various species to catch, remove and relocate them from the impacted area.
- The clearing of vegetation for construction should be limited to just the area for wind turbine erection.
- During construction, a speed limit of 80 km/h should be enforced. The access road should be cleared of tortoises in advance, prior to heavy vehicles travelling on the road.
- It is expected that gravel surfaces will be easier for faunal species to travel across, rather than tar roads.
- Excessive lighting at the facility may attract insects during the night, leading to increased bat collisions. It is preferable that lighting is kept to a minimum during operation to limit bat numbers.

## Protection of vegetation, fauna, avifauna, topsoil, wetlands/pans:

- Areas to be cleared will be clearly marked on-site to eliminate the potential for unnecessary clearing/disturbance.
- The extent of clearing and disturbance to the native vegetation will be kept to a minimum so that impact on flora and fauna is restricted.
- Construction activities will be restricted to demarcated areas so that impact on flora and fauna is restricted.
- All fill material will be sourced from a commercial offsite suitable/permitted source, quarry or borrow pit. Where possible, material from tower base excavations will be used as fill on-site.

- Excavated topsoil (top 25cm) will be stockpiled in laydown areas separate from base material and covered
- Topsoil will not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.
- The maximum topsoil stockpile height will not exceed 2m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.
- Undertake Search and Rescue (S&R) of certain translocatable, selected succulents, shrubs and bulbs occurring in development footprints.

- All rescued plant species should be bagged (and cuttings taken where appropriate) and kept in an on-site nursery (if water can be provided; otherwise off-site) and should be returned to site once construction activities are completed and rehabilitation of a disturbed area is required.
- A site rehabilitation programme must be implemented
- A weed eradication programme must be implemented, where necessary.
- Animals that cannot flee from the affected areas by themselves (e.g. tortoises, amphibians, small mammals) will be removed from the affected areas before the start of site clearing/construction and relocated to safe areas.

- All wetlands, drainage lines and associated buffer zones (viz. 50m) should be excluded from the development footprint.
- Vehicle movements will be restricted to designated roadways
- No new roads will be created, Eskom Operation Exiting roads will be maintained to ensure limited erosion and impact on areas adjacent to roadways.
- A botanist familiar with the vegetation of the area should monitor the rehabilitation success on an annual basis in August or September, and make recommendations on how to improve any problem areas
- Remove all livestock from the site until rehabilitated area has established

- Bird-flappers will be fitted to aerial power line cabling, where required, by a suitably qualified ornithologist.
- A site monitoring programme will be implemented for surveying bird movements in relation to the wind energy facility and fully documenting all collision casualties.
- An on-site monitor of bird turbine collision incidents will be designated for the duration of the operating phase.
- An ornithologist will be designated to provide input on monitoring and mitigation of bird collisions with the turbine blades. All bird collisions to be recorded and reported to a designated ornithologist.

- Adherence to reduced vehicle speeds (as prescribed by the SHE Representative) by any vehicles moving on the site to reduce potential for direct mortalities.
- Excessive lighting at the facility should be avoided.  
Eskom/specialist Operation and maintenance

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Thank you!