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Scoping Assessment: Traffic and Transportation

Proposed Khoe WEF, near De Doorns, WC Province

Prepared for ERM Southern Africa (Pty) Ltd

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SMEC Company Details

Approved by	Reabetswe Mokomele			
Address	267 Kent Avenue			
	Ferndale, Randburg			
	Johannesburg	South Africa		2194
Telephone	011 369 0600		**Website**	www.smec.com
Email	reabetswe.mokomele@smec.com			
Signature				

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1 Introduction

1.1 Background

ERM Southern Africa (Pty) Ltd has submitted to the Energy Team (ET) an environmental services proposal for the development of the Hugo and Khoe Wind Energy Facilities (WEFs) and associated infrastructure near De Doorns in the Western Cape Province.

The principal contract client is The Energy Team (Pty) Ltd. The scoping report comprises traffic engineering work and demonstrates SMEC's capacity to accomplish the scope of work on schedule. The following objectives are included in the Transport Scoping Assessments, which are a component of the overall Environmental Impact Assessment (EIA) process prior to the final Impact Assessment (Specialist Studies: Traffic and Transportation):

- Assess the receiving environment in terms of current state and potential positive or negative impacts;
- Assess site alternatives to make recommendations on the most suitable sites from a traffic and transportation perspective;
- Identify significant issues to be investigated further during the execution of the EIA phase;
- Determine the scope of the ensuing EIA phase, in terms of specialist studies for traffic and transportation; and
- Allow for informed decision-making with regards to the EIA process.

1.2 Study Area

The location of the proposed Hugo WEF and Khoe WEF developments site in relation to the surrounding road network are shown in Figure 1-1. This scoping assessment report refers to the Khoe WEF.

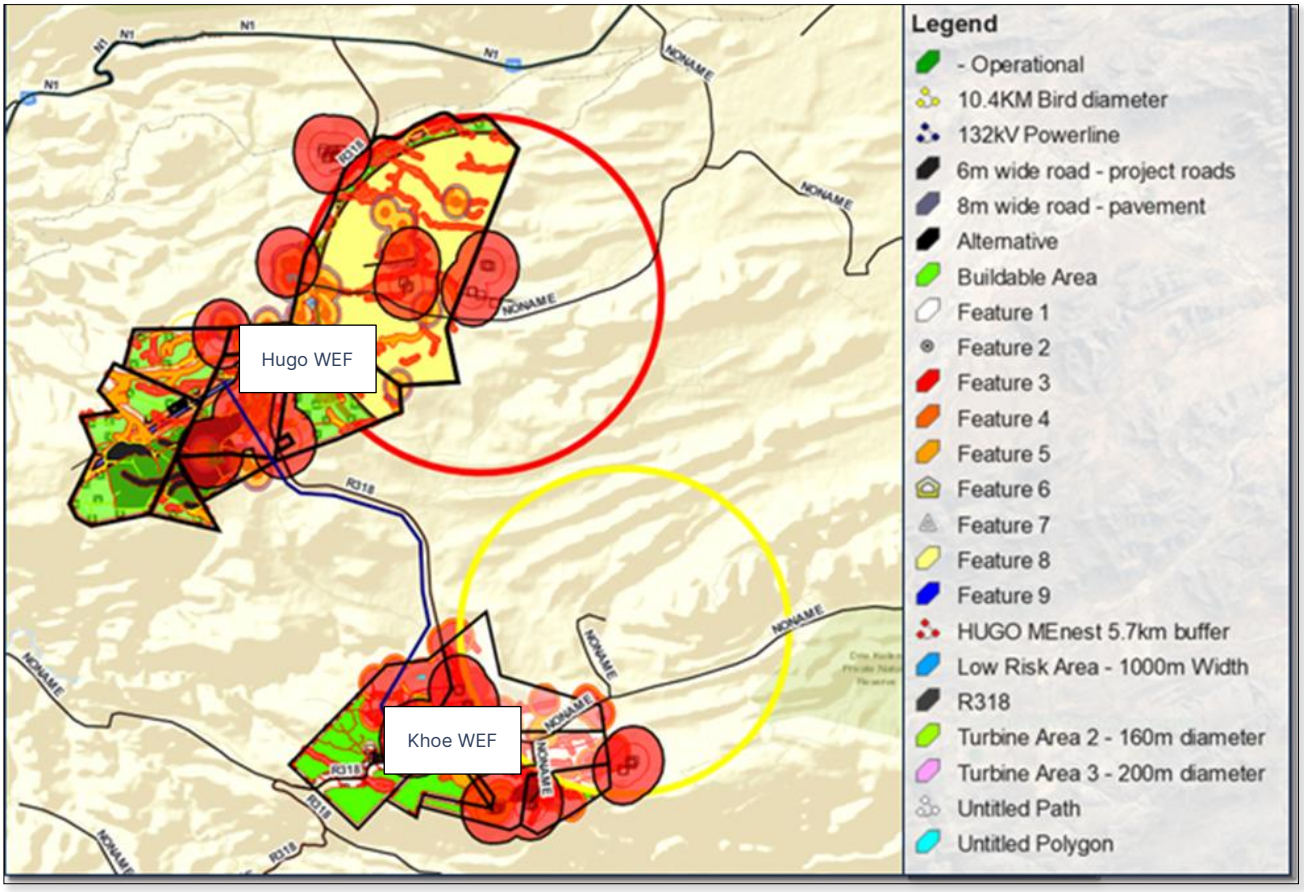

Figure 1-1: Locality Map (QGIS & Google Earth)

1.3 Development Details

The proposed development of Khoe WEF is proposed to comprise up to 38 turbines with a maximum output capacity of up to 290 MW. The Khoe WEF development will be located on five (5) land parcels listed in Table 1-1.

As per technical details of the project, it is proposed that an on-site substation with a capacity up to 132 kV and an up to 33 kV Overhead Powerline (OHPL) or Underground Powerline. However, the extent of the connection to the grid and route cabling to be installed are unknown.

The proposed turbine footprint and associated facility infrastructure is expected to cover an area of up to 4113 ha after rehabilitation, depending on final layout design. The proposed layout of turbines and locations of supporting infrastructure are shown in Figure 1-2.

Table 1-1: Affected Farm Portions

Farm Name	Farm No.	Portion (s)
Portion 1 of the Farm Eendragt No. 38	38	1
Portion 2 of the Farm Eendragt No. 38	38	2
Portion 11 of the Farm Eendragt No. 38	38	11
Plaas No. 193	193	0
Remaining Portion of the Farm Eendragt No. 37	37	RE

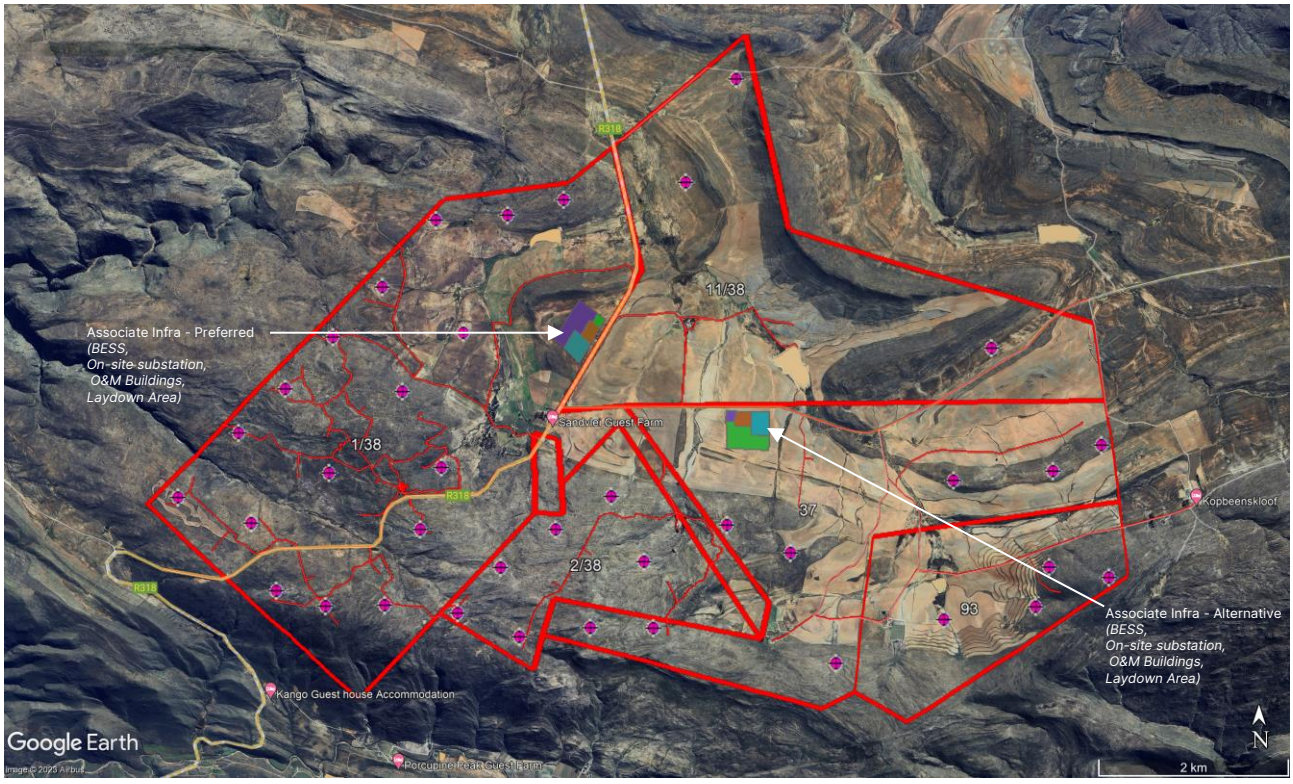

Figure 1-2: Proposed Development Site - Khoe WEF

1.4 Specialist Details

Below is a summary of key specialists involved in the project. A detailed CV of key Specialist, Professional Registration and Declaration will be included in the final reporting EIA stages.

Key Specialist: Victor de Abreu

Victor de Abreu is a registered Professional Civil Engineer with over 34+ years' experience in the Traffic and Transport planning field. He holds a BSc, MSc and GDE from WITS University. Although his main field of expertise is Transport Planning and Traffic Engineering, he has operated in environments with an infrastructure focus particularly related to Roads and Stormwater management and design. Victor has held senior management positions in medium and large consultancy environments and serves in a voluntary capacity in SAICE as well as at board level in the education sector. Victor currently sits on the Board of SMEC South Africa.

Assistant Specialist: Reabetswe Mokomele

Reabetswe Mokomele is a registered Candidate Engineer with over 6+ years' experience in the Traffic and Transport Planning field. He holds a BEng (Civil) degree from the University of Johannesburg. Reabetswe's main field of expertise is Transport Planning and Traffic Engineering focusing particularly on undertaking technical and feasibility studies, site investigations, road master planning, traffic impact assessments (TIA) of varied scope to support various land-use planning for private/government clients.

Supporting Assistant Specialist: Siphelele Ndwandwe

Siphelele Ndwandwe has worked as an intern in the Planning and Traffic Engineering department of SMEC South Africa for almost a year. She graduated from Mangosuthu University of Technology with a diploma in Civil Engineering. She spent time working as technical support on several transport planning and traffic analysis projects. She has worked with traffic engineering software such as SIDRA, QGIS, and AutoCAD.

1.5 Methodology and Approach

A desktop study and site visit were conducted to understand the existing receiving environment of the potential sites. The sites were then evaluated based on their advantages and disadvantages in terms of traffic and transportation, particularly relative to available access and infrastructure of the existing road network. The potential traffic and transport related impacts were then identified for future assessment and the data collection and consultation requirements for the full Impact Assessment were determined. This information can be used as input into the wider scoping assessment and evaluation of the sites from the perspective of other disciplines, for the selection of the final site. The methodology and approach are summarised in Figure 1-3.

Figure 1-3: Summary of Methodology and Approach

1.6 Site Visit Details

A site visit was conducted on Friday, 06 October 2023 for purposes of identifying any fatal flaws with respect to various aspects including traffic and transportation. The site visit included a high-level evaluation of the current local transportation infrastructure network in the vicinity of proposed Khoe WEF development sites. The findings were recorded in the form of a Site Sensitivity/Site Visit Report and will be used as a basis for the design layout.

2 Receiving Environment

2.1 Land use

The proposed Khoe WEF development site is situated in mainly agricultural land, with some natural and semi-natural vegetation. These activities are expected to continue during the construction, operation, and eventual decommissioning of the sites.

2.2 Road Network

The general location of the sites is made up of farmlands with rural unpaved Class 4 roads without names supporting movement between the various farms as well as access to some of these land parcel. The access roads will be constructed or upgraded to provide access to the WEFs from existing public roads. The exact location and design of the access roads will be determined, considering the environmental and social impacts, the technical feasibility, and the landowner agreements. The complete major road network is shown in Figure 2-1 in relation to the proposed WEF project area and described further in Table 2-1.

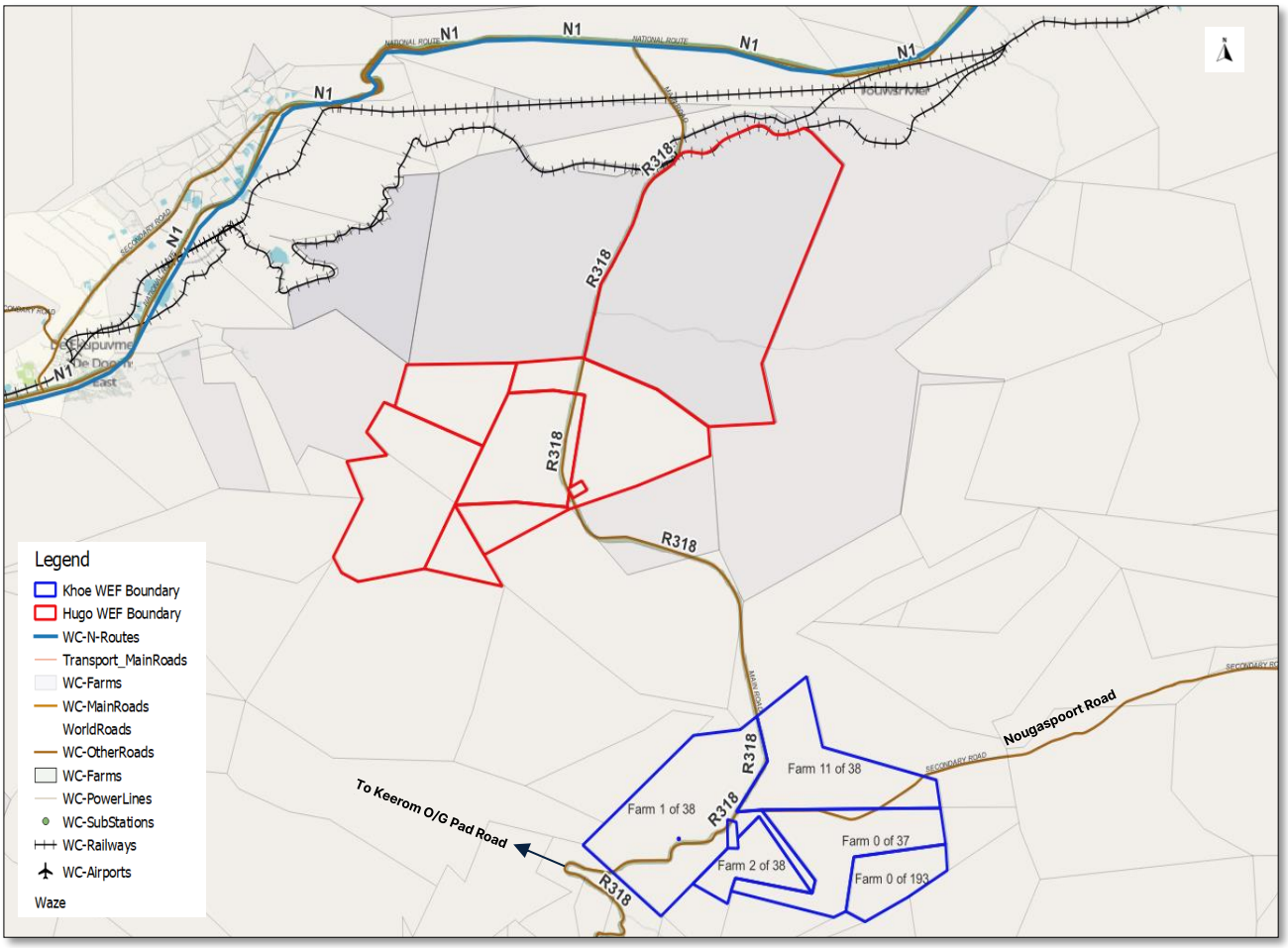

Figure 2-1: Surrounding Major Road Network

Table 2-1: Major Road Network

Road Name	Class	Description	Road Ownership
N1 (Worcester)	1	• The N1 is a class 1 road, which is a principal arterial that provides high mobility and low access. It is a national route that runs from Cape Town through Bloemfontein, Johannesburg, Pretoria, and Polokwane to Beit Bridge on the border with Zimbabwe. • The N1 is part of the Trans-African Highway network and forms the Cape to Cairo Road with the N4 and the A1 in Zimbabwe. • The N1 is also a scenic route that offers views of the Cape Winelands, the Hex River Valley, the Karoo, the Free State, and the Waterberg. • The traffic flows on the N1 vary according to the time of day, the season, the weather, and the road conditions. • The N1 is one of the busiest roads in South Africa, especially in the urban areas of Cape Town, Johannesburg, and Pretoria. • The N1 experiences high traffic volumes and congestion during peak hours, holidays, weekends, and special events.	SANRAL
R318	3	• The R318 road is a class 4 road, which is a collector street that provides access and activity. • The R318 road is a provincial route in South Africa that runs from N1 near De Doorns through Montagu to R60 near Ashton. • The R318 road passes through the Hex River Valley, which is known for its vineyards, fruit farms, and scenic views. • The R318 road also connects to the R62 road, which is a popular tourist route that links Cape Town and Port Elizabeth.	Western Cape Government Department of Transport and Public Works, South African National Roads Agency (SANRAL),
Nougaspoort Road	4	• The Nougaspoort Road is a road in the Western Cape Province of South Africa that runs from Touws River to Montagu. • The Nougaspoort Road is partly paved and partly gravel. • the Nougaspoort Road is a class 4 road, which is a collector street that provides access and activity.	Western Cape Government Department of Transport and Public Works
To Keerom O/G Pad Road	4	• The Keerom O/G Pad road is a class 5 road, which is a local street that provides low mobility and high access. • The quality of the Keerom O/G Pad road is not very high, as it is subject to frequent damage and deterioration due to the heavy and frequent traffic of trucks and machinery that transport equipment and materials to and from the O/G Pad. • The road also suffers from erosion, potholes, and dust, which affect the safety and comfort of the road users.	Western Cape Government Department of Transport and Public Works

3 Site Alternatives Evaluation

As the sites are in a similar location, particularly in terms of the major road network, the main differentiation between sites from a transportation perspective was in terms of local access and available infrastructure. The Substation site was evaluated, however grid connection and integration lines were not evaluated from a transportation perspective as the effects of these do not have significant impacts on the transportation related assessment criteria. The full completed assessment sheet for Traffic and Transportation is included in the following sections covering both the preferred and alternative sites. The preferred and alternative infrastructure sites are located relatively close to each other and have no significant distinguishing aspects in terms of accessibility.

Site evaluation aims to provide a transparent explanation of WEF locations and infrastructure, demonstrate compliance with local planning requirements, and consider technical factors.

The route determination study would analyse several modes of transportation, such as ships, trains, air, and roadways, for transporting wind turbine components to the proposed wind energy project site. Nearby harbors like Cape Town, Saldanha Bay, and Lamberts Bay are thought to be potential entrance locations for imported components. Transport routes between these harbors/ports and the project location be investigated.

Between Cape Town and Saldanha Bay, there is a rail network with routes passing through several localities. The Saldanha-Sishen railway line connects the Saldanha Bay port with the Sishen iron ore deposit in the Northern Cape region. Transport of tower components, nacelles, and 45-meter blades will be required from either the Cape Town Metropolitan Area or Saldanha Bay. This Scoping and subsequent Specialist Traffic and Transportation Study do not encompass a detailed route determination study.

3.1 Preferred Site

Table 3-1: Advantages and Disadvantages of Preferred site

Site: Khoe WEF	Sub-Station Site: Advantages	Sub-Station Site: Disadvantages
Traffic and Transportation: Accessibility	• Located within 600m from main paved class 3 road (R316). • Relatively cheaper to upgrade access or construct an access road. • Relatively flat and straight along (R316) presenting no vertical and horizontal sight distance issues for the potential main access point. • Can obtain access off either of the existing nearby T-junctions which located a km apart	• Currently inaccessible as there is no existing direct farm access. • Will require an application for formal access from the relevant roads authority.

3.2 Alternative Site

Table 3-2: Advantages and Disadvantages of Alternative site

Site: Khoe WEF	Laydown Area: Advantages	Laydown Area: Disadvantages
Traffic and Transportation: Accessibility	• Located along a class 4 road where direct access to properties is allowed along rural roads.	• Located more than 1.7km from the main paved road (R316). • Current access road is gravelled • Relatively expensive to upgrade to paved or tar.

	• Gravel access road has relatively wide road reserves.	• Low level crossings might require upgrading. • Currently inaccessible as there is no existing direct farm access. • Will require an application for formal access from the relevant roads authority.

4 Way Forward

Specialist inputs into the scoping assessment will be combined to determine the preferred site, not only from a traffic and transportation assessment. Once selected, the site layout plan will be developed and a final Impact Assessment including specialist studies for traffic and transportation will need to be conducted. Scoping allows for the identification of the anticipated impacts, particularly those that will require details specialist investigations.

This section of the report aims to predict the potential impacts likely to occur from the undertaking of the proposed activities that will need to be evaluated during the Impact Assessment phase of the EIA regardless of the alternative site selected.

4.1 Project Life Cycle

The project life cycle for a new substation and power line includes the following primary activities:

- **Feasibility phase** - This includes selecting a suitable location for the substation and buffer as well as a corridor for the line route, which is assessed as part of the EIA. Servitude negotiations are also initiated during this phase.
- **Planning and design phase** - This phase, which is only undertaken should environmental authorisation be obtained, includes the following:
    - Aerial survey of the route;
    - Selection of the most appropriate structures;
    - Eskom and environmental specialists (e.g., ecologist, heritage) conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria; and
    - Preparation of relevant planning documentation, including technical and design documentation.
- **Construction phase** – During the implementation of the project, the construction activities related to the installation of the necessary infrastructure and equipment is undertaken.
- **Operational phase** - This includes operational activities associated with the maintenance and control of the substation and the power line.
- **Decommissioning** - This phase will include measures for complying with the prevailing regulatory requirements, rehabilitation and managing environmental impacts to render the affected area suitable for future desirable use.

The potential impact is expected to be minimal or insignificant during the planning, and the rehabilitation phase. This is due to low volumes of traffic expected to be generated by the two phases. Considering this, only the Construction, Operational and Decommissioning phases are anticipated to require investigation during the Impact Assessment Phase of the EIA process for the selected site.

4.2 Anticipated Traffic and Transportation Related Impacts

This section describes the anticipated construction phase related impacts to be assessed as part of the specialist assessment of the Impact Assessment phase of the EIA. The results (Impact Assessment Rating) of the high-level screening of impacts for both the preferred and alternative sites are included in the following section and are based on the prescribed Hacking Methodology (Part 2: Ranking the Significance of Environmental Aspects and Impacts) which is included in Appendix B.

The adopted methodology follows the requirements of Appendix 2 of GN R982, of the 2014 EIA Regulations in terms of the identification of potential significance of environmental aspects during scoping. As per the adopted impact assessment methodology, the overall significance (risk) of the impacts associated with the significant aspects can be determined by considering the risk as follows.

- **Significance of Environmental Impact (Risk) = Probability x Consequence.**

Whereby consequence is based on the criteria for ranking the severity, duration, and spatial extent of impacts. Figure 4-1 shows the various ranking criteria followed during the iterative process of the assessment.

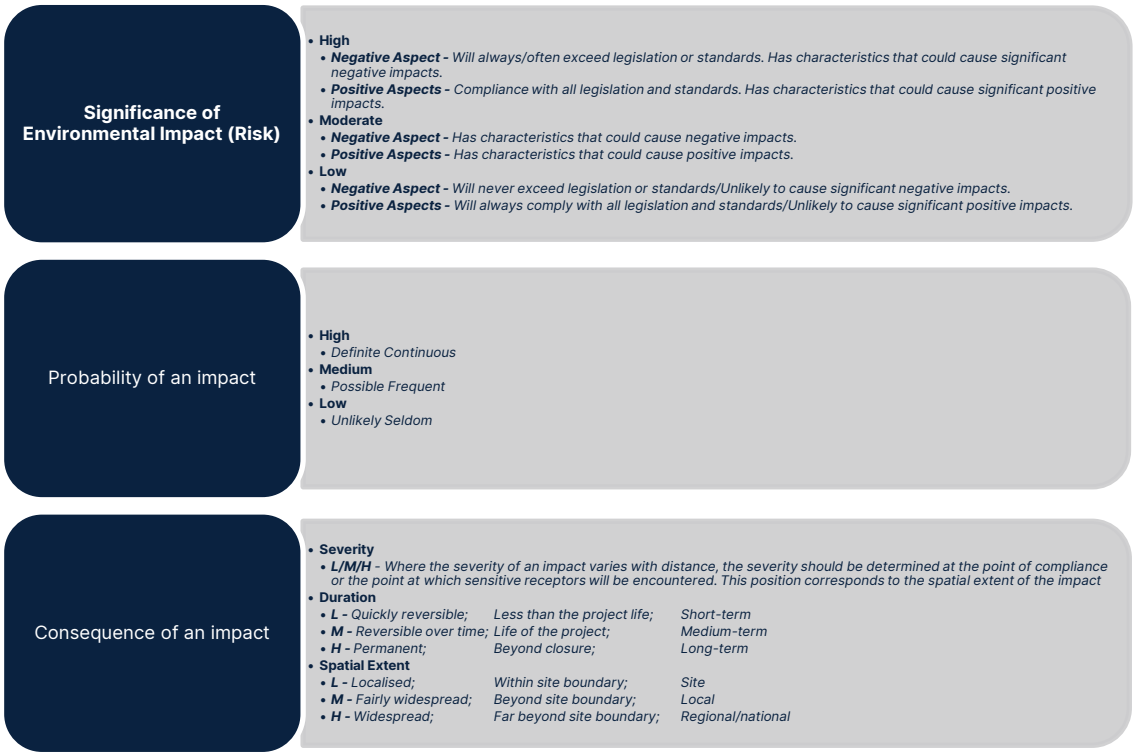

Figure 4-1: Criteria for Ranking Impacts

4.2.1 Deterioration of road network conditions

Heavy vehicle traffic during both construction and decommissioning phase of the development are expected to cause additional wear and tear on the surrounding road network. Internal project gravel roads to individual turbine sites are also expected to sustain damage during the construction and decommissioning phase of the project (i.e., surface distress - gravel loss leading to damage to the existing gravel road layers and rutting).

4.2.2 Impact of dust along gravel access roads

Heavy vehicles are expected to cause dust along unpaved access roads to the site during the transportation of various components to the site leading to possible loss of visibility from a safety point of view, health, damage to roadside vegetation and environmental impact such as air pollution.

4.2.3 Impact of additional traffic volumes on road sections, intersection capacity and traffic safety

The project will inevitably result in the disruption of traffic on Local, Regional, and National Routes but to some varying degrees. The severity of the impacts will depend on the order of the road (how many lanes, width, length, turns, etc.), the receiving environment and vicinity of land uses and towns. Additional traffic on the road network could result in changes to the operations of that road network. Additionally, the severity of the impacts will depend on the expected traffic volumes to be generated by the proposed development. A full traffic impact study will be required to estimate the volume of traffic associated with the transportation of personnel and materials/components to site during the construction and operational phases. The standards, manuals, and guideline documents to be used are as follows (as applicable):

- Technical Methods for Highways (TMH) 16: Volume 1 and Volume 2 - South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual; and
- Technical Recommendations for Highways (TRH) 26 South African Road Classification and Access Management Manual (Version 1.0 August 2012).

4.2.4 Impact of abnormal loads

The project will inevitably result in the movement of abnormal loads on Local, Regional and National Routes, but to varying degrees. The severity of the impacts will depend on the travelling speed, vehicle size and loaded height of the abnormal vehicles expected. Thus, additional abnormal traffic on the road network could result in changes to the operational performance/level of service of that road network. The standards, manuals, and guideline documents to be used are as follows (as applicable):

- The National Road Traffic Regulations (1999) promulgated under Section 75 of the National Road Traffic Act (Act No. 93 of 1996) regulate the conveyance of abnormal loads and dangerous goods on public roads; and
- TRH 11 Dimensional and Mass Limitations and Other Requirements for Abnormal Load Vehicles.

4.3 Potential Impact Assessment Rating

Table 4-1: Impact Assessment Rating - Road Network Conditions

Impact Phase: Construction							
Potential impact description: **Deterioration of Road Network Conditions** Detailed description of impact Road damage - Additional wear and tear on the surrounding road network caused by development heavy vehicles. Gravel roads to various sites are also expected to sustain damage during the construction and decommissioning phase of the project (i.e., surface distress - gravel loss leading to damage to the existing gravel road layers and rutting).							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Medium	Medium	Negative	Medium	Medium	High
With Mitigation	Low	Medium	Low	Neutral	Low	Low	High
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Limit number and frequency of heavy and overloaded vehicles where possible* • *Must not exceed legally permissible axle mass load of heavy vehicles* • *Continuous Monitoring, Maintenance and upgrading of affected road pavement sections*							
Residual impact	*Yes, but acceptable as of low negative significance negative impact as most toads are currently in fair to good conditions*						

Table 4-2: Impact Assessment Rating – Impact of Dust along Gravel Access Roads

Impact Phase: Construction							
Potential impact description: **Impact of dust along gravel access roads** Detailed description of impact Heavy vehicles are expected to cause dust along unpaved access roads to the site during the transportation of various components to the site leading to possible loss of visibility from a safety point of view, health, damage to roadside vegetation and environmental impact such as air pollution.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Medium	Medium	Negative	High	Medium	High
With Mitigation	Low	Low	Low	Neutral	Midium	Low	High
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Managed				
Mitigation measures to reduce residual risk or enhance opportunities: • *Regular wet grading and wetting for dust suppression to minimize the negative impact* • *Limit dust generation activities during strong wind periods*							
Residual impact	*Yes, but acceptable as of low negative significance*						

Table 4-3: Impact Assessment Rating – Impact of Additional Peak Hour Traffic Volumes, Intersection Capacity and Traffic Safety

Impact Phase: Construction							
Potential impact description: **Impact of additional traffic volumes on road sections and intersection capacity and traffic safety** Detailed description of impact Disruption of traffic on Local, Regional, and National Routes due to additional peak hour traffic volumes associated with the transportation of personnel and materials/components to site during the construction. Additional traffic on the road network could result in changes to the normal operations of that road network.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Medium	Medium	Negative	Medium	Medium	High
With Mitigation	Low	Low	Low	Neutral	Medium	Medium	Medium
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Yes, can be managed and mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Schedule development traffic movement to not coincide with existing peaks where possible* • *Encourage use of public transportation* • *Implementation of approved Traffic Management Plan*							
Residual impact	*Yes, but acceptable as of low negative significance due to construction phase period being significantly lower than project life*						

Table 4-4: Impact Assessment Rating – Impact of Abnormal Loads

Impact Phase: Construction							
Potential impact description: **Impact of abnormal loads** Detailed description of impact The project will inevitably result in the movement of abnormal loads on Local, Regional and National Routes, but to varying degrees. The severity of the impacts will depend on the travelling speed, vehicle size and loaded height of the abnormal vehicles expected. Thus, additional abnormal traffic on the road network could result in changes to the operational performance/level of service of that road network.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Medium	Medium	Negative	Medium	High	Medium
With Mitigation	Medium	Medium	Low	Neutral	Medium	Medium	Medium
Can the impact be reversed?			NO				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			NO but can be managed and mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Ensure heavy vehicle safety and overloading checks* • *Legally permissible maximum dimension and axle mass load of heavy vehicles* • *Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc* • *Maintain reasonable travel speed to avoid unnecessary traffic congestion*							
Residual impact	*Yes, unacceptable high negative impact if no measures are implemented*						

Table 4-5: EIA Risk Assessment

		PRIOR TO MITIGATION										POST MITIGATION								
Reference	Impact Description	Phase	Severity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact	Mitigation Measures	Severity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact
PRF	Deterioration of road network condition	Construction	Medium	Medium	Medium	Medium	Medium	High	Negative	Medium	Limit number and frequency of heavy and overloaded vehicles where possible, Upgrading of pavement, Do not exceed legally permissible axle mass load of heavy vehicles	Low	Low	Low	Low	Low	High	Neutral	Low
PRF	Increase in dust along unsurfaced gravel access roads	Construction	Low	Low	Medium	Low	Medium	High	Negative	Medium	Regular wet grading and wetting for dust suppresion to minimise the negative impact	Low	Low	Low	Low	Low	High	Neutral	Low
PRF	Increase in peak hour traffic volumes	Construction	Medium	Medium	Medium	Medium	Medium	High	Negative	Medium	Limit use of private cars, Schedule development traffic movement to not coincide with existing peaks where possible, Encourage use of public transportation, •Implementation of approved Traffic Management Plan	Low	Low	Low	Low	Medium	Medium	Negative	Medium
PRF	Impact of abnormal loads	Construction	High	Medium	Medium	Medium	Medium	High	Negative	Medium	Ensure heavy vehicle safety and overloading checks, Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc, Maintain reasonable travel speed to avoid unnecessary traffic congestion	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium
ALT	Deterioration of road network condition	Operation	Medium	Medium	Medium	Medium	Medium	High	Negative	Medium	Limit number and frequency of heavy and overloaded vehicles where possible, Upgrading of pavement, Do not exceed legally permissible axle mass load of heavy vehicles	Low	Low	Low	Low	Low	High	Neutral	Low
ALT	Increase in dust along unsurfaced gravel access roads	Operation	Medium	Medium	Medium	Medium	Medium	High	Negative	Medium	Regular wet grading and wetting for dust suppresion to minimise the negative impact	Low	Low	Low	Low	Low	Medium	Neutral	Low
ALT	Increase in peak hour traffic volumes	Operation	Medium	Medium	Medium	Medium	Medium	High	Negative	Medium	Limit use of private cars, Schedule development traffic movement to not coincide with existing peaks where possible, Encourage use of public transportation, •Implementation of approved Traffic Management Plan	Low	Low	Low	Low	Medium	Medium	Negative	Medium
ALT	Impact of abnormal loads	Operation	High	Medium	Medium	Medium	Medium	High	Negative	Medium	Ensure heavy vehicle safety and overloading checks, Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc, Maintain reasonable travel speed to avoid unnecessary traffic congestion	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium

4.4 Cumulative Impact Assessment Rating

There are currently no other identified planned Renewable Energy Facilities within 35 km of the Khoe WEF except the Hugo WEF of which an application is being sought by the same developer.

The addition of other WEFs in the area is expected to increase the overall impact due to increased construction-related activities. However, some impacts will be unavoidable but can remain within acceptance tolerances. The overall impacts are expected to be of moderate negative significance post mitigation through appropriate measures.

Table 4-6: Cumulative Impact Assessment Rating - Road Network Conditions

Impact Phase: Construction							
Potential impact description: **Deterioration of Road Network Conditions** Detailed description of impact Road damage - Additional wear and tear on the surrounding road network caused by development heavy vehicles. Gravel roads to various sites are also expected to sustain damage during the construction and decommissioning phase of the project (i.e., surface distress - gravel loss leading to damage to the existing gravel road layers and rutting).							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	Medium	Medium	Negative	High	Medium	High
With Mitigation	Low	Low	Low	Neutral	Medium	Medium	High
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Limit number and frequency of heavy and overloaded vehicles where possible* • *Do exceed legally permissible axle mass load of heavy vehicles* • *Continuous Monitoring, Maintenance and upgrading of affected road pavement sections*							
Residual impact	*Yes, but acceptable as of low negative significance negative impact as most toads are currently in fair to good conditions*						

Table 4-7: Cumulative Impact Assessment Rating – Impact of Dust along Gravel Access Roads

Impact Phase: Construction							
Potential impact description: **Impact of dust along gravel access roads** Detailed description of impact Heavy vehicles are expected to cause dust along unpaved access roads to the site during the transportation of various components to the site leading to possible loss of visibility from a safety point of view, health, damage to roadside vegetation and environmental impact such as air pollution.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	Medium	Medium	Medium	Negative	High	Medium	High
With Mitigation	Low	Low	Low	Neutral	Low	Low	High
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Managed				
Mitigation measures to reduce residual risk or enhance opportunities: • *Regular wet grading and wetting for dust suppression to minimize the negative impact* • *Limit dust generation activities during strong wind periods*							
Residual impact	*Yes, but acceptable as of low negative significance*						

Table 4-8: Cumulative Impact Assessment Rating – Impact of Additional Peak Hour Traffic Volumes, Intersection Capacity and Traffic Safety

Impact Phase: Construction							
Potential impact description: **Impact of additional traffic volumes on road sections and intersection capacity and traffic safety** Detailed description of impact Disruption of traffic on Local, Regional, and National Routes due to additional peak hour traffic volumes associated with the transportation of personnel and materials/components to site during the construction. Additional traffic on the road network could result in changes to the normal operations of that road network.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	High	Medium	Negative	High	High	High
With Mitigation	Medium	Medium	Medium	Negative	Medium	Medium	Medium
Can the impact be reversed?			YES				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			Yes, can be managed and mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Schedule development traffic movement to not coincide with existing peaks where possible* • *Encourage use of public transportation* • *Implementation of approved Traffic Management Plan*							
Residual impact	*Yes, but acceptable as of low negative significance due to construction phase period being significantly lower than project life*						

Table 4-9: Cumulative Impact Assessment Rating – Impact of Abnormal Loads

Impact Phase: Construction							
Potential impact description: **Impact of abnormal loads** Detailed description of impact The project will inevitably result in the movement of abnormal loads on Local, Regional and National Routes, but to varying degrees. The severity of the impacts will depend on the travelling speed, vehicle size and loaded height of the abnormal vehicles expected. Thus, additional abnormal traffic on the road network could result in changes to the operational performance/level of service of that road network.							
	Severity	**Extent**	**Duration**	**Status**	**Probability**	**Significance**	**Confidence**
Without Mitigation	High	High	Medium	Negative	High	High	High
With Mitigation	Medium	Medium	Medium	Neutral	Medium	Medium	Medium
Can the impact be reversed?			NO				
Will impact cause irreplaceable loss or resources?			NO				
Can impact be avoided, managed or mitigated?			NO but can be managed and mitigated				
Mitigation measures to reduce residual risk or enhance opportunities: • *Ensure heavy vehicle safety and overloading checks* • *Legally permissible maximum dimension and axle mass load of heavy vehicles* • *Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc* • *Maintain reasonable travel speed to avoid unnecessary traffic congestion*							
Residual impact	*Yes, unacceptable high negative impact if no measures are implemented*						

Table 4-10: Cumulative EIA Risk Assessment

Reference	PRIOR TO MITIGATION										POST MITIGATION								
	Impact Description	Phase	Severity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact	Mitigation Measures	Severity	Extent	Duration	Consequence of Impact	Probability	Confidence	Status	Significance of Impact
PRF	Deterioration of road network condition	Construction	High	Medium	Medium	Medium	High	High	Negative	Medium	Limit number and frequency of heavy and overloaded vehicles where possible, Upgrading of pavement, Do not exceed legally permissible axle mass load of heavy vehicles	Low	Low	Low	Low	Medium	High	Neutral	Medium
PRF	Increase in dust along unsurfaced gravel access roads	Construction	Medium	Medium	Medium	Medium	High	High	Negative	Medium	Regular wet grading and wetting for dust suppresion to minimise the negative impact	Low	Low	Low	Low	Medium	Medium	Neutral	Medium
PRF	Increase in peak hour traffic volumes	Construction	High	High	Medium	High	High	High	Negative	High	Limit use of private cars, Schedule development traffic movement to not coincide with existing peaks where possible, Encourage use of public transportation, •Implementation of approved Traffic Management Plan	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium
PRF	Impact of abnormal loads	Construction	High	High	Medium	High	High	High	Negative	High	Ensure heavy vehicle safety and overloading checks, Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc, Maintain reasonable travel speed to avoid unnecessary traffic congestion	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium
ALT	Deterioration of road network condition	Operation	High	Medium	Medium	Medium	High	High	Negative	Medium	Limit number and frequency of heavy and overloaded vehicles where possible, Upgrading of pavement, Do not exceed legally permissible axle mass load of heavy vehicles	Low	Low	Low	Low	Medium	High	Neutral	Medium
ALT	Increase in dust along unsurfaced gravel access roads	Operation	Medium	Medium	Medium	Medium	High	High	Negative	Medium	Regular wet grading and wetting for dust suppresion to minimise the negative impact	Low	Low	Low	Low	Medium	Medium	Neutral	Medium
ALT	Increase in peak hour traffic volumes	Operation	High	High	Medium	High	High	High	Negative	High	Limit use of private cars, Schedule development traffic movement to not coincide with existing peaks where possible, Encourage use of public transportation, •Implementation of approved Traffic Management Plan	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium
ALT	Impact of abnormal loads	Operation	High	High	Medium	High	High	High	Negative	High	Ensure heavy vehicle safety and overloading checks, Implementation of approved Traffic Management Plan - Warning devices and use of escort vehicles, traffic officers, etc, Maintain reasonable travel speed to avoid unnecessary traffic congestion	Medium	Medium	Medium	Medium	Medium	Medium	Negative	Medium

4.5 Assumptions and Limitations

The following assumptions and limitations accompany the Scoping exercise:

- In accordance with the purpose of Scoping, the report does not include detailed specialist investigations on the receiving environment, which will only form part of the EIA phase. The environment in the project area was primarily assessed through site visits and appraisals, desktop screening, incorporating existing information from previous studies, and input received from authorities and IAPs. A refinement of all maps will also be undertaken in the EIA phase, if necessary;
- The construction phase is expected to have the highest traffic impact of all the phases as it will primarily comprise of transporting equipment, turbine components, personnel, construction, and other facility materials comprising of normal, heavy, and abnormal load vehicles. For the construction phase of the wind farm, the following assumptions will be made for trip estimations purposes:
    - Construction period;
    - Vehicle options for transportation of material and equipment delivery;
    - Facility components specifications as per the technical details;
    - Vehicle options for transportation of daily commuters and labour workforce;
- The operational phase is expected to have comparatively minimal traffic impact as the only transport required will be associated with monitoring, operation, and maintenance. For the operational phase of the wind farm, the following assumptions will be made for trip estimations purposes:
    - Onsite permanent staff consisting of operational and maintenance teams;
    - Daily labour transportation modes;
    - Occasional major repair/servicing events.
- The decommissioning phase is expected to take place after envisaged facility lifespan of 20 – 25 years if there is no longer an economical / technical basis for an energy plant. Hence, the Wind Energy Facility would be decommissioned and the land rehabilitated. Therefore, it is assumed that this phase will generate the same trips and traffic impact relative to the construction phase and over the same period.

4.6 Plan of Study for EIA Phase

This section outlines key tasks which are required to produce the Traffic and Transportation Impact Assessment Specialist Study for the EIA Phase of the project.

4.6.1 Site Investigation and Desktop Study Requirements

Site investigations and desktop screening have been carried out during the initial Site Assessment Visit.

4.6.2 Data Collection Requirements

To understand the effects of additional traffic on the road network, an understanding of existing road network traffic conditions is required. Thus 12-hour manual classified traffic counts data should be collected at key intersections around the proposed development. Up to 9 manual classified traffic counts are anticipated. Additional SANRAL CTO station data will be collected to develop an understanding of general traffic patterns along the major road network. Locations of survey intersections are indicated in Figure 4-2 and listed below.

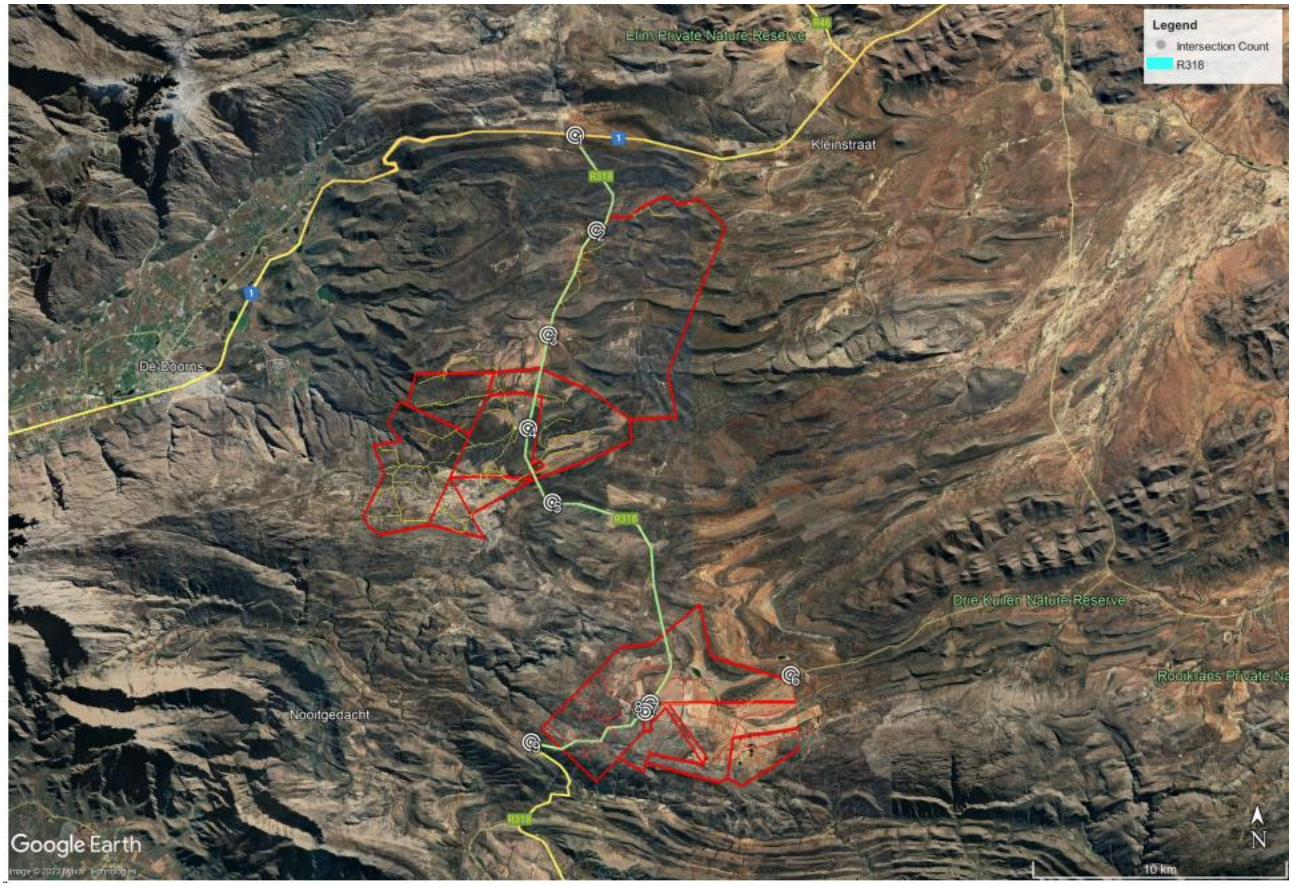

Figure 4-2: Locations of traffic counts

4.6.3 Access Arrangements Requirements

An analysis of access routes and site access positions will be re-evaluated based on the final layout of the turbine positions. Site distance assessment will also be included in the evaluation of access, particularly during the construction phase, to ensure safety and its appropriateness. It has been assumed that site access will be gained using existing roads.

4.6.4 Trip Generation, Assignment and Distribution

Traffic volumes for the construction, operational and decommissioning phases will be estimated based on information received from the client. It is assumed that the client will make information available about the construction, decommissioning and operational approach as well as the preferred origin of vehicles and staff where possible.

4.6.5 Traffic Impact and Mitigation

Base year and forecast year capacity analysis will be undertaken at key local junctions to determine the current traffic operational conditions and the potential impact of the anticipated development trips on the surrounding road network. The analysis will be carried out using SIDRA microsimulation tool to evaluate the level of service and

operational performance during the construction, operational and decommissioning phases. Traffic mitigation or management measures as well as residual impacts for the development will be outlined.

4.6.6 Updating of Impact Significance and Ratings

An update on the impact of the development on predicted traffic and pavement loading, along with significance ratings will be included. Additionally, the assessment of traffic impacts during the project lifecycle will inform the EIA phase, where an environmental significance scale will be used to evaluate the importance of a particular impact.

4.6.7 Updating of Transportation Plan

An update to the high-level transportation plan for the construction phase will be conducted based on comments and inputs from various stakeholders. This update will involve amongst others a review of origins and destinations of equipment and the transportation route (options) from the point of delivery to the site.

4.6.8 Consultation Requirements

Consultation with relevant national/provincial/local road authorities is required to ensure approval of the EIA Traffic and Transportation Specialist Assessment. The following authorities will need to be consulted as part of the Impact Assessment procedure:

- SANRAL;
- Western Cape Provincial Roads Department; and
- Langeberg Local Municipality/ Cape Winelands District Municipality.

The extent of consultations will depend on the site selected and whether new access intersections will be required.

4.6.9 Recommendations

The final traffic and transportation assessment will outline conclusions and recommendations to mitigate any traffic impacts of the proposed development on road users and surrounding communities.

Where construction of site access/intersections, new external/internal roads or upgrading of existing roads is required, the impact of such related construction activities will be managed and mitigated through traffic control and traffic accommodation measures. An example of a stop-and-go operation typically implemented during upgrades on access points is shown in Figure 4-3.

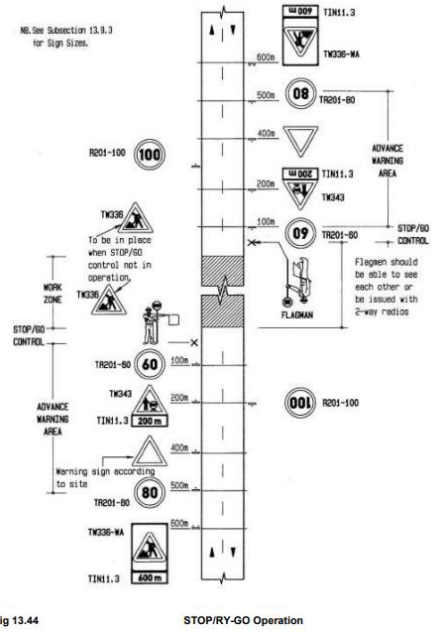

Fig 13.44 STOP/RY-GO Operation

Figure 4-3: Stop and Go (SARTSM Volume 2)

5 Recommendations

Based on the nature and extent of the proposed Khoe WEF development, some level of disturbance can be expected on the immediate road network and regionally because of the construction and operational phases. The overall potential impact is expected to be moderate to low during both the construction phase and operational phase, respectively.

It is the opinion of the traffic engineering project team that the impacts associated with the project can be assessed and mitigated to an acceptable level for any of the two sites. However, the cost of mitigation measures differs by site. In this regard the preferred sites for the Khoe WEF on-site substation, O&M buildings are recommended for Environmental Authorisation from a traffic and transportation perspective.

Appendix A **Hacking Methodology**

AN INNOVATIVE APPROACH TO STRUCTURING ENVIRONMENTAL IMPACT ASSESSMENT REPORTS

Part 2: Ranking the Significance of Environmental Aspects and Impacts

By: T. Hacking

Anglo American plc

(Currently Environmental Manager at Konkola Copper Mines plc, Zambia)

Abstract

This paper (Part 2) describes a qualitative/ semi-quantitative approach to assessing the significance of environmental aspects and environmental impacts. The approach is intended as a tool for use together with the general framework presented in Part 1.

INTRODUCTION

Owing to the complexity of many of the systems that need to be considered when undertaking an Environmental Impact Assessment (EIA), it is not always possible to obtain quantitative data on which to base the impact assessment. Therefore, it is often necessary to use qualitative or semi-quantitative methods to determine the significance of environmental impacts.

The significance ranking approach presented in this paper is intended as a tool for use together with the general framework presented in Part 1 and is the final step in completing the structured and systematic approach. In Part 1 it was shown how environmental impacts can be linked to the project activities via the responsible "mechanisms", which are defined as *environmental aspects* in the ISO 14 000 series of standards. It was explained that significant impacts would only be present if significant aspects are present. Hence, a method for ranking the significance of aspects is required. Once the significance aspects have been identified, it is necessary to rank the significance of the impacts that could result form them.

SIGNIFICANCE OF ENVIRONMENTAL ASPECTS

The significance of environmental aspects can be determined and ranked by considering the criteria presented in Table 1. In some cases it may be necessary to undertake the impact assessment to determine whether a particular aspect is significant. Therefore, a fair degree of iteration is unavoidable during the assessment process.

Table 1 – Criteria used to determine the significance of environmental aspects

Significance Ranking	Negative Aspects	Positive Aspects
H (High)	Will always/often exceed legislation or standards. Has characteristics that could cause significant negative impacts.	Compliance with all legislation and standards. Has characteristics that could cause significant positive impacts.
M (Moderate)	Has characteristics that could cause negative impacts.	Has characteristics that could cause positive impacts.
L (Low)	Will never exceed legislation or standards. Unlikely to cause significant negative impacts.	Will always comply with all legislation and standards. Unlikely to cause significant positive impacts.

The aspect identification and ranking process is largely a screening exercise whereby the aspects that do not have the potential to cause significant impacts are eliminated. Aspects ranked "high" and "moderate" are significant and the possible impacts associated with their presence will need to be determined. Aspects ranked "low" do not warrant further attention.

The significance of the aspects should be ranked on the assumption that the management recommended in the EIA will be in place i.e. *with management*. This represents the scenario that the proponent wishes to have considered for approval. The environmental aspects associated with the proposed project activities during the construction, operational, closure phases (where appropriate) need to be identified. The influence of various project alternatives on the significance of the aspects must also be considered.

It may be desirable to also undertake a *without management* aspect ranking, since this highlights the sensitivity of the key risk areas to management and, hence, the management priorities. However, the dilemma in such an exercise is deciding on how much management to include. In the case of a mining project, for example, does one assume that the tailings dam will be completely absent or merely operated poorly? A useful rule of thumb is to assume that all the management required for operational reasons will be in place, but that any management specifically for environmental control will be absent. The danger in presenting *without management* ranking scenario in an EIA report is that it does not represent the scenario that the proponent wishes to have approved.

SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

Where significant environmental aspects are present ("high" or "moderate"), significant environmental impacts ***may*** result. The significance of the impacts associated with the significant aspects can be determined by considering the risk:

Significance of Environmental Impact (Risk) = Probability x Consequence

The consequence of impacts can be described by considering the severity, spatial extent and duration of the impact.

Severity of Impacts

Table 2 presents the ranking criteria that can used to determine the severity of impacts on the bio-physical and socio-economic environment. Table 3 provides additional ranking criteria for determining the severity of negative impacts on the bio-physical environment.

Table 2 – Criteria for ranking the *Severity* of environmental impacts

Type of Criteria	Negative			Positive		
	H-	M-	L-	L+	M+	H+
Qualitative	Substantial deterioration. Death, illness or injury.	Moderate deterioration. Discomfort.	Minor deterioration. Nuisance or minor irritation.	Minor improvement.	Moderate improvement.	Substantial improvement.
Quantitative	Measurable deterioration.		Change not measurable i.e. will remain within current range.		Measurable improvement.	
	Recommended level will often be violated.	Recommended level will occasionally be violated.	Recommended level will never be violated.		Will be within or better than recommended level.	
Community Response	Vigorous community action.	Widespread complaints.	Sporadic complaints.		No observed reaction.	Favourable publicity

Table 3 – Criteria for ranking the *Severity* of negative impacts on the bio-physical environment

Environment	Ranking Criteria		
	Low (L-)	Medium (M-)	High (H-)
Soils and land capability	Minor deterioration in land capability. Soil alteration resulting in a low negative impact on one of the other environments (e.g. ecology).	Partial loss of land capability. Soil alteration resulting in a moderate negative impact on one of the other environments (e.g. ecology).	Complete loss of land capability. Soil alteration resulting in a high negative impact on one of the other environments (e.g. ecology).
Ecology (Plant and animal life)	Disturbance of areas that are degraded, have little conservation value or are unimportant to humans as a resource. Minor change in species variety or prevalence.	Disturbance of areas that have some conservation value or are of some potential use to humans. Complete change in species variety or prevalence.	Disturbance of areas that are pristine, have conservation value or are an important resource to humans. Destruction of rare or endangered species.
Surface and Groundwater	Quality deterioration resulting in a low negative impact on one of the other environments (ecology, community health etc.)	Quality deterioration resulting in a moderate negative impact on one of the other environments (ecology, community health etc.).	Quality deterioration resulting in a high negative impact on one of the other environments (ecology, community health etc.).

Spatial Extent and Duration of Impacts

The duration and spatial scale of impacts can be ranked using the following criteria:

Table 4 – Ranking the *Duration* and *Spatial Scale* of impacts

	Ranking Criteria		
	L	**M**	**H**
Duration	Quickly reversible Less than the project life Short-term	Reversible over time Life of the project Medium-term	Permanent Beyond closure Long-term
Spatial Scale	Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national

Where the severity of an impact varies with distance, the severity should be determined at the point of compliance or the point at which sensitive receptors will be encountered. This position corresponds to the spatial extent of the impact.

Consequence of Impacts

Having ranked the severity, duration and spatial extent, the overall consequence of impacts can be determined using the following qualitative guidelines:

Table 5 – Ranking the *Consequence* of an impact

SEVERITY = L

DURATION	Long-term	**H**			
	Medium-term	**M**			**MEDIUM**
	Short-term	**L**	**LOW**		

SEVERITY = M

DURATION	Long-term	**H**			**HIGH**
	Medium-term	**M**		**MEDIUM**	
	Short-term	**L**	**LOW**		

SEVERITY = H

DURATION	Long-term	**H**			
	Medium-term	**M**			**HIGH**
	Short-term	**L**	**MEDIUM**		
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/national
			SPATIAL SCALE		

To use Table 5, firstly go to one of the three "layers" based on the severity ranking obtained from Table 2 and/ or Table 3. Thereafter determine the consequence ranking by locating the intersection of the appropriate duration and spatial scale rankings.

Overall Significance of Impacts

Combining the consequence of the impact and the probability of occurrence, as shown by Table 6, provides the overall significance (risk) of impacts.

Table 6 – Ranking the *Overall Significance* of impacts

PROBABILITY	Definite Continuous	**H**	**MEDIUM**		**HIGH**
	Possible Frequent	**M**		**MEDIUM**	
	Unlikely Seldom	**L**	**LOW**		**MEDIUM**
			L	**M**	**H**
			CONSEQUENCE (from Table 5)		

The overall significance ranking of the negative environmental impacts provides the following guidelines for decision making:

Table 7 – Guidelines for decision-making

Overall Significance Ranking	Nature of Impact	Decision Guideline
High	Unacceptable impacts.	Likely to be a fatal flaw.
Moderate	Noticeable impact.	These are unavoidable consequence, which will need to be accepted if the project is allowed to proceed.
Low	Minor impacts.	These impacts are not likely to affect the project decision.

Priority of Primary Impacts

In some cases environmental aspects could result in impacts on a number of environments. For example, the release of contaminated runoff could pollute surface water, which in turn could adversely impact on the ecology. In such cases the impact on the environment in which the first or primary impact occurs should be considered first. In the example "surface water" is the environment on which the primary impact occurs. If it can be shown that the impact on the primary environment will be insignificant, then secondary impacts need not be considered.

CONCLUSIONS

While the significance ranking methodology presented in above is not a substitute for more sophisticated qualitative methods, it is a step forward from the arbitrary methods that are often used to determine the significance of environmental impacts. In many instances it is impractical or prohibitively costly to source the data required to undertake a fully quantitative assessment and, hence, a qualitative or semi-quantities approach is the best option available. If used in conjunction with the general framework outlined in Part 1, it provides a systematic and structured approach to undertaking an EIA.

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