



-REPORT-

SOCIAL IMPACT ASSESSMENT FORMING PART OF THE EIA FOR THE PROPOSED PEGASUS-UMFOLOZI 400 kV TRANSMISSION LINE

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APPENDIX W

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PROPOSED PEGASUS –UMFOLOZI 400 kV TRANSMISSION LINE

SOCIAL IMPACT ASSESSMENT

1. DEFINITION OF SOCIAL IMPACT ASSESSMENT

According to the International Association for Impact Assessment (IAIA), “impact assessment, simply defined, is the process of identifying the future consequences of a current or proposed action”¹. Social impact assessment (SIA) is therefore the process of assessing or estimating, in advance, the social consequences or changes that are likely to emanate from a proposed development. Significance is attributed to these consequences or changes, based on a number of social impact variables (see below).

Two internationally widely applied definitions that are in line with, but expand upon, the IAIA definition, will be used to guide the present study. In this regard, Social Impact Assessment is defined as:

- “a process aimed at identifying the future consequences for human populations of any public or private action that alters the way in which people live, work, play, relate to one another, organise to meet their needs, and generally cope as members of society” (Becker, 1999).
- “(an investigation into) the potential change in the activity, interaction and/or sentiment of the community, as it responds to the impacts resulting from the alteration in the surrounding social and biophysical environment” (Adapted from Burdge, 1995).

Both definitions are important in that they highlight a unique characteristic of social assessments, i.e. evaluation of impacts on the individual per sé, and impacts on the individual *in interaction* with the social and biophysical environment. The social impact assessment variables that were applied for the purposes of the study (see below) are responsive to the inherently interactive nature of human endeavour.

¹ IAIA (2001), available on-line.

2. METHODOLOGY

The methodology for the Social Impact Assessment is-out in the sub-sections below.

2.1 Data Gathering

The data, which served as input for the SIA, was generated by a number of means, as is discussed below.

2.1.1 Primary data gathering

✧ Public Participation and Consultation

The public participation and consultation process has served as the chief data-gathering 'vehicle' for the social impact assessment. A number of in-depth interviews and focus group meetings were held with specific stakeholders and stakeholder groupings to further unpack issues of concern, explore possible mitigation measures regarding the candidate route distilled out as part of the scoping process.

✧ Site Visits

Site visits took the form of a Helicopter flyover of the study area, as well as vehicular trips. The site visits served to identify areas of particular sensitivity as well as clear 'no-go' sections of the study area that would appear to be fatally flawed from a social impact perspective. In this sense then, the site visits served to focus the social enquiry, permitting more in-depth analysis of viable sections, thus informing the process of selecting a candidate route for the 400 KV transmission line.

2.1.2 Secondary data gathering

Over and above the primary data process, secondary data was sourced and analysed. This included the Integrated Development Plans (IDPs) being formulated as well as allied data sourced from the relevant local and district authorities.

2.1.3 Other specialist studies

Integration workshops were held with other specialists at regular intervals during the study. The findings from other specialists served to put the impacts as perceived by Interested and Affected Parties (I&APs) into perspective, thus facilitating a more accurate rating of impacts.

2.2 Impact Variables and Rating of Impacts

2.2.1 Impacts Variables

Social Impact Assessment variables serve to explain the consequences of specific developments and, as such, do not relate to the total social environment. The following variables were assessed (adapted from Burdge, 1995) on the basis that they reflect probable social impacts as a result of the proposed transmission line:

- Population impacts.
- Socio-economic impacts.
- Farming and infrastructure-related impacts.
- Public health, safety and security impacts.
- Direct intrusion of the project on communities, including noise and dust.
- Aesthetic / sense of place related impacts.
- Impacts on places of cultural, historical and archaeological significance.

Only variables considered to be relevant to this study were assessed, based on, *inter alia*, factors relating to the probability of the events occurring and the number of people impacted upon. These variables were assessed in respect of the construction, operation and decommissioning stages of the project.

2.2.2 Rating of Impacts

2.2.2.1 Primary Rating Criteria

The rating of social impacts was based on the criteria contained in the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989. These criteria are briefly summarised below to guide the reader through the assessment per se.

✧ Nature of the impact

This includes an appraisal of the manner (*what* and *how*) in which construction, operation and maintenance of a development is anticipated to affect the receiving social environment.

✧ Extent of the impact

This is a description as to whether the impact will be:

- local (extending only as far as the development site area; or limited to the site and its immediate surroundings); or
- regional; or
- national; or
- across international borders.

✧ **Duration of the impact**

This serves as an indication whether the lifespan of the impact would be short term (0-5 years), moderate-term (5-15 years), long-term (16-30 years) or permanent.

✧ **Intensity and Status**

Under this rating criterion, the intensity of the impact and its valence (positive or negative) is described using a rating continuum of *none*, *low*, *moderate* or *high*. ‘*None*’ is defined as no influence on the social environment; ‘*low*’ as minor influence on the social environment, requiring some mitigation; ‘*moderate*’ as more marked influence on the social environment, requiring greater emphasis on mitigation and ‘*high*’ as having significant impact, requiring significant mitigation measures. The rating ‘*potentially high*’ has been introduced in cases where impact intensity would be dependent on factors such as final (detail) route alignment and the degree of success attained by Eskom in its negotiations with affected property owners regarding compensation, servitudes across properties and relocation, amongst others.

The additional rating of ‘cumulative impacts’ serves to account for the incremental impacts of an action (e.g. proposed transmission line) added to other past, present, and reasonably foreseeable future actions. The rating ‘no-go’ was used only if impacts were anticipated to be potentially catastrophic.

✧ **Probability of occurrence**

This includes a description of the probability of the impact actually occurring, i.e. improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

✧ **Significance**

Based on a synthesis of the information contained in the above-described procedure, the potential impacts were assessed based on the following significance criteria:

- ✧ **No significance:** the impacts do not influence the proposed development and/or environment in any way.
- ✧ **Low significance:** the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- ✧ **Moderate significance:** the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a

modification in the project design or implementation of effective mitigation measures.

- ✧ **High significance:** the impacts will have a major influence on the proposed development and/or environment. The impacts could have the “no-go” implication on portions of the development regardless of any mitigation measures that could be implemented.

2.2.2.2 Allied Considerations

The impacts were also assessed in terms of legal requirements, suggestions were made as to what relevant South African legislation, and permit requirements could be considered in respect of the various impact variables.

3. SOCIAL IMPACT ANALYSIS PER SECTION

3.1 Demarcation of study area

The study area has been divided into sections, using horizontal and vertical numeric markers. The length and width of the division has been informed by the characteristics of a particular area, i.e. the degree to which distinctions that could be drawn. In other words:

- ✧ the more homogenous (e.g. low density, private farms) an area, the ‘coarser’ the division
- ✧ the more heterogeneous an area (e.g. mixed land uses and higher density population), the finer the division.

However, within the context of a coarser division, specific impacts of note (e.g. where relocation of families would be required) were pointed out using the specific numeric grid markers, ranging from A-H (vertical) and 1-56 (horizontal). Where applicable, it was pointed out whether impacts would be more marked in the case of the northern section or southern section of the study area, thus informing decisions regarding the routing of the transmission line. It should be noted that a grid demarcation of, say, N14, does *not* refer to north-14, but to a grid location ‘N’ (vertical) and number 14 (horizontal), so as to demarcate a impact focal point.

3.2 Structure of the SiA section

A brief, general description of each section with the accompanying issues identified precedes the impact assessment, which is presented in table format, including a discussion.

3.3 Description of the study area

The proposed 400 kV Transmission line route passes through two Municipal Regions and a variety of local Municipalities in KwaZulu/Natal. Most of the line traverses the uMzinyathi Regional Council area (DC-24), which incorporates the Dundee (Endumeni: KZ-241) (starting point: Pegasus) and Nqutu Local Councils (KZ-242), inter alia. The rest of the line falls within the Ulundi Council area, its end-point being at Umfolozi.

The demographic characteristics, land-use profile, infrastructure en route, socio-economic characteristics and issues/impacts are discussed on a section-for-section basis below. The information has been sourced from²:

- The Integrated Development Plan (IDP) for the Umzinyathi District Municipality (Bergman Ingérop/Setplan/Dludla Development Consortium);
- The Nquthu IDP – Draft Aggregation Report (Scott-Wilson); and
- The Interim IDP for the Ulundi Municipality (Vuka Town and Regional Planners).
- Primary data sources (minutes of meetings held; records of personal discussions with I&APs).

3.4 Section 3 –13 (E-H)

3.4.1 General description of the area

The starting point of the study area is the Pegasus Sub-Station, situated 10 km south-east of Dundee (Endumeni) in the KwaZulu-Natal Province. The “upper part” of the Umzinyathi District Municipality area, which includes the Endumeni, Nquthu, Msinga and uMvoti Local Municipalities fall within the study area. From its starting point, the line passes largely through grass-land and to a lesser extent cultivated land.

3.4.2 Demographic characteristics

According to the Umzinyathi District Municipality Integrated Development Plan (IDP), the estimated population in the entire district is 427 052 people (with a female majority), mainly living in dispersed homesteads in the rural areas. One can therefore conclude that the total population density in this section of the line is very low.

The predominant languages spoken are English and isiZulu and high levels of illiteracy are at the order of the day.

Five primary schools have been recorded along this section of the route, as well as church grounds.

² Refer to end of document for detailed references.

3.4.3 Land-use profile

The area is largely characterised by grassland and to a lesser extent commercially cultivated land (livestock and crop (wheat/maize) production), with dispersed rural settlements. The area has a unique historical background consisting of a number of battlefields of the Anglo Zulu war e.g. the Battle of Talana, as well as rock paintings of the San people.

3.4.4 Infrastructure *en- route*

The R33 is the main route through the District Municipality area, linking the Endumeni, Msinga and Umvoti areas.

3.4.5 Socio-economic characteristics

Although there are various industry sectors, especially in the Endumeni area, such as trade, construction, farming, mining, social services and manufacturing, the skills levels in the area are still low and of a basic nature. The tourism sector is seen to have potential for improvement.

As in most rural areas in South Africa, the residents living in the central and southern parts of the District do not have access to adequate social infrastructure e.g. health care facilities, crèches, community centres etc. There is also a lack of adequate electricity supply and telecommunication services in the Umzinyathi District.

3.4.6 Issues/impacts

- ✧ Inflow and outflow of temporary workers.
- ✧ Relocation of individuals and families.
- ✧ Disruption of social networks and daily movement patterns.
- ✧ Socio-economic impacts (e.g. job creation).
- ✧ Disruption of farming activity (e.g. access routes, fences and gates).
- ✧ Loss of residential/agricultural land.
- ✧ Social problems due to construction camps.
- ✧ Health, safety and security (e.g. fire risks).
- ✧ Tourism impacts.
- ✧ Intrusion impacts.
- ✧ Impacts on sense of place and aesthetic quality.
- ✧ Sites of religious, cultural, historical or archaeological significance.

3.4.7 Social impacts

The social impact assessment per section is set out in the table below.

Table 3-1: Social Impact Assessment Tables: Section 3-13 (E-H)

Section 3-13 (E-H)		
Theme	3.4.7.1 Population Impacts	
Nature of impact	3.4.7.1.1 Inflow and outflow of temporary workers	
Legal requirements	None	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction / decommissioning	Intermittent (maintenance)
Intensity	Moderate	Moderate
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Not applicable	Negligible
Level of significance	Moderate	Moderate, to low
Mitigation measures	The conduct of contract workers would have to be specified in construction camp management plans, including use and management of sanitation, water and waste as well as informal trading, running shebeens and interfering in local community/cultural affairs. A peer-group based incentive/fine scheme has been implemented successfully in other projects to help ensure compliance. Before commencement of construction, a bonus (e.g. R 30 000) is allocated to the workers and a fine system instituted. Compliance/transgressions are monitored by the Environmental Officer, the local community/property owners and fellow workers. Every transgression carries a fine (e.g. R 30.00 for	Not applicable.

	littering; R 120.00 for lighting a fire at a spot not demarcated for this purpose). These fines are subtracted from the bonus and the balance is split between workers at the end of the construction period. All transgressions are displayed in the site-office together with the name of the 'offender'. The idea of this system is to promote peer-group monitoring and penalising. This is usually effective, as all would benefit from keeping the bonus at the maximum.	
Level of significance after mitigation	Moderate to low	Low
EMP requirements	Contract compliance with EMP and monitoring of compliance.	As per construction & decommissioning

Discussion

Given the specialist nature of transmission line construction, outside specialist contractor teams³ will be deployed. The nature, extent and impact of this variable will depend on possible disruptions/intrusion/environmental impacts due to the presence of contractors (whether local or not) as well as potential clashes due to differences in racial and ethnic composition between locals and outside contractors.

The presence of contractors and construction camps *per sé* is associated with a number of social and environmental problems, particularly in the wake of poor construction camp management practices. Such problems can include the erection of informal dwellings and allied problems such as lack of water, sanitation and waste disposal infrastructure, with concomitant health, environmental pollution and aesthetic impacts. In the rainy season, surface water run-off can result in faeces being washed into streams, posing health risks elsewhere. (The recent cholera epidemic in the Province is still fresh in everyone's mind). These problems can be exacerbated in the event of an in-migration of job-seekers from elsewhere, who may set-up informal dwellings in the vicinity of the construction camps. The probability of this occurring is, however, slight, given the limited potential for employment. Moreover, it is common practice for local informal vendors (notably women providing cooked food) to enter the area, given the new business opportunity provided by the construction workers.

The 'moderate to low' significance rating following mitigation serves to account for potential deviations by contractors from such provisions, as experience suggests, is not uncommon.

³ Refer to section on employment equity, job creation and training.

Section 3-13 (E-H). Specific impact focal points: F/G 8 (north) (dwelling(s)); G10/11 (south) (dwelling(s).)		
Theme	Population Impacts	
Nature of impact	3.4.7.1.2 Relocation of Individuals and Families⁴	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines.	
Stage	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Permanent (spatial); Psycho-social (see discussion below).	See discussion below.
Intensity	Low (south and north).	Low (south and north).
Probability of occurrence	Highly probable	Highly probable
Status of the impact	Negative	Negative
Cumulative Impact	Not applicable	Not applicable
Level of significance	High	High
Mitigation measures	<ul style="list-style-type: none"> ✧ Align route in a manner so as to limit the extent of relocation. ✧ Compensation for re-settlement and loss of dwelling and/or land. 	As during construction/decommissioning.
Level of significance after mitigation	Potentially moderate	Potentially moderate

⁴ Rating informed by anticipated extent of relocation, should the proposed transmission line follow a route closely aligned with the existing Athene-Pegasus and Pegasus-Umfolozi transmission lines. Dwellings on northern alignment digitally captured.

EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)
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Discussion

A number of dwellings could potentially be affected, depending on the final route alignments (see ‘specific localities’ at the top of this table).

It would be important for Eskom to be mindful of factors such as the current economic base of the property owner access to transport, schools and other social services if dwellings are relocated. It is important to consider that any change requires adaptive capacity by those who face relocation. (Relocation is recognised as a source of stress on life events scales). The ability to adapt to change is dependent on the psychological make-up of the individual; the nature and extent of the change as well as the degree to which social support is available within the family and community as well as a break with current social networks. The factors must be understood within the context of more tangible considerations such as ability to make a living in the newly allocated area, or being able to access current places of work without incurring major transport expenses or having to travel greater distances.

Section 3-13 (E-H).		
Theme	Population Impacts	
Nature of impact	3.4.7.1.3 Disruption of social networks and daily movement patterns	
Legal requirements	None.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate (Motivation: Low population density).	Moderate to low (Motivation: Relatively low frequency and extent of maintenance and inspection activity if compared to construction phase).
Probability of occurrence	Highly probable	Probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable (Motivation: Higher rate of maintenance and inspection activity due to the present of three transmission lines in the study area:- Athene-Pegasus; Pegasus-Umfolozi(1) and Pegasus-Umfolozi(2))
Level of significance	Moderate(low density population)	Low
Mitigation measures	<p>✧ <u>Disruption of existing social networks:</u> Mitigation of this impact is not readily achievable, as the contractor cannot readily be held accountable for worker conduct outside of working hours. It would, nevertheless be prudent for the contractor to encourage sensible conduct among workers, particularly as alcohol use, interference in local networks and unsustainable relationships are</p>	

	<p>concerned.</p> <ul style="list-style-type: none"> ✧ <u>Disruption of daily movement patterns:</u> (See EMP requirements below). 	
Level of significance after mitigation	Moderate, to low	Moderate, to low
EMP requirements	<p>Stipulate measures such as:</p> <ul style="list-style-type: none"> ✧ Strict adherence to speed limits when using local roads. ✧ Disciplinary action for reckless and drunk driving. ✧ Strict enforcement of policies regarding the use of construction vehicles for private use over weekends (e.g. to visit shebeens; to transport locals, etc.). ✧ Limiting use of local roads before schools start and at the end of the school day. ✧ Registration of a road servitude to access construction terrain. <p>There is little doubt that a monitoring function would have to be performed in respect of the above. This role could be fulfilled by the Environmental Officer, although community involvement in monitoring is desirable. For example, a toll-free complaints number could be posted across the construction area for use by the community. Co-operation with local traffic law enforcement agencies would be important to ensure compliance with traffic legislation.</p>	As during construction.

Further specialist studies required? No.

Discussion

- ✧ Disruption of existing social networks: In view of being separated from their families, it is common for construction workers to engage with local communities. Short-term, unsustainable relationships with local women can result, with social consequences (e.g. unwanted pregnancies) manifesting long after construction workers have left the area. Unbecoming and unruly conduct of workers seeking recreational opportunities in local communities is another potential source of social conflict with the potential to disrupt social networks.
- ✧ Disruption of daily movement patterns: Construction related vehicular movement has the potential to disrupt the daily movement patterns of the local population and poses safety risks for children walking to primary schools in the area. (Sections of note: G6; F12; G12(schools)). The point of access to the construction terrain from main access road(s) is a potential impact focal point.

Section 3-13 (E-H).		
Theme	3.4.7.2 Socio-economic impacts	
Nature of impact	3.4.7.2.1 Employment equity, job creation and training	
Legal requirements	The following Acts should be considered: Basic Conditions of Employment Act 75 of 1997; Skills Development Act 97 of 1998; Labour Relations Act 66 of 1995; Employment Equity Act 55 of 1998; and Government's Preferential Procurements Act of 1999.	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate (negative): Lack of employment equity. Low (positive): job creation.	Moderate(negative): Lack of employment equity. Job creation: Little or no positive impact.
Probability of occurrence	Probable (negative and positive impacts).	Probable (negative and positive impacts).
Status of the impact	Ranging from Negative to Positive	Ranging from Negative to Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	High	High
Optimisation measures (job creation).	The key optimisation measure is to ensure that locals (individuals; SMMEs) with the relevant skills/expertise are employed for construction. This would necessitate the creation of a labour desk as well as a skills audit to identify skills levels and determine training requirements. Multi-skills training would be sensible to ensure that skills are transferable and employment sustainable. It may be prudent to put in place standardised	Same optimisation measure as during construction and decommissioning apply, with the exception that the focus is operation and maintenance.

	<p>communication and dispute resolution procedures in respect of employment creation and training.</p> <p>The above would have to be standardised in the form of a contract provision, specifying input (training and job-creation plans) and output key performance indicators (actual evidence that local contractors & labour is being used).</p>	
Level of significance after mitigation	Moderate to low	High (lack of equity in respect of the specialised component of the maintenance work cannot be mitigated). Rating therefore remains moderate. Job creation marginal to non-existent during operation.
EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)

Discussion

Employment equity refers to the extent to which the local skills match the requirements of the project proponent during construction, operation and decommissioning or, put differently, a lack of employment equity refers to a mismatch between local skills and the requirements of the proponent. This variable ranges from negative to positive. The *negative rating* serves to account for the specialised components of transmission line construction, which locals would not be able to undertake, despite training. This (main) component of the work is exclusively the domain of specialists. The *positive rating* serves to account for the job creation and training (during construction/decommissioning), which can readily be allocated to contractors / SMMEs by the main contractor. The optimisation measures discussed above serve to 'unlock' the positive impacts.

An allied consideration in terms of this impact variable is that of potential conflict between locals as well as locals and outsiders. In this regard, it is important to consider that jobs are a scarce commodity. Introducing such a commodity into a resource-starved environment by itself has the potential to create competition as people attempt to secure this scarce commodity, hence the need for dispute resolution.

Job creation is a particularly pressing imperative, given the high unemployment rates. According to the IDP, the predominance of females has resulted in a weak economy, which may point to the need to focus on women when undertaking recruitment drives.

Section 3-13 (E-H).		
Theme	Socio-economic impacts	
Nature of impact	3.4.7.2.2 Improved national, regional and local economy	
Legal requirements	None. (Provisions of the Development Facilitation Act to be considered).	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Low (positive) (local economic spin-offs).	High (positive) (regional/national).
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Positive	Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ Consider the socio-economic strategies of the Integrated Development Plans for the uMzinyathi District/Municipality with a view to maximising local economic spin-offs. ✧ Promote use by contractors of local service industries (e.g. accommodation) and visitation of tourism attractions. ✧ Promote procurement of local building materials and services (backward linkages) for use during construction. 	Maximise use of local raw materials, goods and services through deliberate local affirmative procurement policies and strategies.

Level of significance after mitigation	High	High
EMP requirements	Not applicable.	Not applicable.
Further specialist studies required? Yes, quantification of economic spin-offs at the local, regional and national level.		
<p><u>Discussion</u></p> <p>It is evident that there will be <i>limited</i> direct benefit to local communities as a result of the new transmission line. Both the inflow of contractors as well the increased income level of locals who would secure employment during construction and operation is anticipated to have local economic spin-offs. It must, however, be noted that any new transmission line does not infer a tariff increase to local electricity supply. These tariffs are set independently by the local distribution authority (e.g. Municipality).</p> <p>The new transmission line is also anticipated to have a favourable economic impact at regional and national level, given that it would meet demand for additional electricity in the Richards Bay area. This area and its surrounds continue to show significant growth as an industrial centre in South Africa, and recently proposed developments are anticipated to result in a greater demand being placed on the electricity grid.</p> <p>It is important that Eskom considers in its planning the Integrated Development Plan for the uMzinyathi District, the Nqutu Council and the Endumeni (Dundee) Council. The Endumeni Council has appointed the Bergmaningerop/ Setplan/ Dludla Development Consortium to prepare an Integrated Development Plan (IDP) for the District as well as Endumeni. The firm Scott-Wilson, in turn, is responsible for the Nqutu IDP.</p>		

Section 3-13 (E-H).		
Theme	Infrastructure/Socio-economic impacts	
Nature of impact	3.4.7.2.3 Disruption of farming activities	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Potentially permanent
Intensity	Moderate	Moderate
Probability of occurrence	Highly Probable	Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Close coordination with affected property owners / farmers is required to glean more information on farming-related activities and time-frames (planting; harvesting). Where possible, the constructing activities and roll-out of the program should be responsive to the imperatives of the farmers.</p> <p>It would also be prudent to involve farmers/property owners and their representative organisations (e.g. Farmers'/Agricultural Unions) in discussions regarding construction activities, mitigation measures (including route alignment) as well as procedures in the case of compensation for</p>	As during construction, with the addition that land-owners and the relevant authorities would have to be informed of maintenance activities in advance.

	<p>maintenance; stock and crop losses.</p> <p>The above should be included in the contractual provisions set by Eskom for the contractor.</p>	
Level of significance after mitigation	Potentially low, depending on the efficacy of mitigation.	Potentially low, depending on the efficacy of mitigation.
EMP requirements	<p>Stipulate mitigation measures such as:</p> <ul style="list-style-type: none"> ✧ Which existing roads can be used; ✧ Due process to be followed if additional access is required; ✧ Due process to be followed if life-stock is to be moved away from the construction terrain; ✧ Speed limits on local roads; ✧ Conduct by workers on-site (including closing of gates); ✧ Rehabilitation after completion of the construction process. 	As during construction.

Further specialist studies required? No.

Discussion

In cultivated areas, construction and operation and to a lesser extent, decommissioning activities could exert a negative impact on farming activity (e.g. harvesting and irrigation; movement/access of tractors/trucks) and result in crop destruction. Clearance of land to facilitate construction and increased use of local roads (maintenance) and/or the creation of additional access roads (erosion risk), as well as livestock loss due to gates being left open by workers, could have financial implications for farmers. Similar impacts could result from maintenance activity during operation, when workers would have to access properties. An allied consideration is the potential restriction on growth and harvesting of crops in the servitude. Moreover, harvesting methods could be adversely affected due to mechanised harvesting equipment not being able to negotiate the pylons.

Section 3-13 (E-H). Specific impact focal points: Cultivated land.		
Theme	Socio-economic impacts	
Nature of impact	3.4.7.2.4 Loss of land or agricultural land-use	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Potentially permanent
Intensity	Potentially high	Potentially high
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on land-uses. ✧ Route planning to be mindful of the objective to minimise economic losses. 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on land-uses. ✧ Route planning to be mindful of the objective to minimise economic losses.
Level of significance after mitigation	Moderate	Moderate

EMP requirements	<ul style="list-style-type: none"> ✧ Formal land negotiation process with directly affected property/land owners; ✧ Limit construction, decommissioning and operation/maintenance 'intrusions'. ✧ Limit impact through route alignment adjustments (where feasible and practicable). 	Draft provisions to minimise impacts on tourism activity.
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Further specialist studies required? Yes, quantification of potential losses to be done on a property-specific basis once final route alignment has been determined.

Discussion

In this section, there are pockets of cultivated land, which the proposed transmission line traverses. Whilst land-owners may not erect or build infrastructure under the lines, most farming activities may continue. A corridor of approximately **50m wide?** is required for the servitude of a 400 kV transmission line. The degree of loss of land is subject to the type of pylon to be used and the nature and extent of construction activity. Harvesting may also be disrupted due to the shape and footprint of the power pylon and construction activity. Cumulative impacts are highly probable, as no less than three pylons would traverse the study area, once the current transmission line becomes operational.

Section 3-13 (E-H).		
Theme	Socio-economic	
Nature of impact	3.4.7.2.5 Potential disruption of infrastructure and services	
Legal requirements	None.	
Stage	Construction/Temporary	Operation
Extent of impact	Local	N/A
Duration of impact	Construction	N/A
Intensity	Low to potentially high	N/A
Probability of occurrence	Highly probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	Moderate	N/A
Mitigation measures	Consultations are to be held prior to construction with agencies and individuals whose infrastructure may be affected. Detail maps are required which contain details on surface and sub-surface infrastructure. Construction would have to be planned in a manner to ensure minimal disruption of such infrastructure. In cases where such disruption is inevitable, negotiations would have to be held with affected parties prior to construction to discuss compensations or restoration.	N/A
Level of significance after mitigation	Potentially low.	N/A

EMP requirements	Very specific details are to be included on the geographic locality of infrastructure and how this is to be dealt with from a construction perspective.	
Further specialist studies required? No, consultations and negotiations to be held with affected parties once candidate route has been determined.		
<p><u>Discussion</u></p> <p>There are two main roads, which traverse the study area, namely the R 33 and the R 68, which may be crossed by the proposed transmission line. Other considerations are telecommunications infrastructure, irrigation systems, and sub-surface pipelines, which could be damaged through construction activity. The resultant disruption in essential services (e.g. water / sanitation / electricity supply) or restricted road use could range in intensity from having mere 'nuisance value' to being more severe. This would typically be the case if commercial enterprises and access to towns and villages were disrupted for extended periods. However, mitigation is readily achievable, thus justifying a post-mitigation 'low significance' rating.</p>		

Section 3-13 (E-H).		
Theme	Socio-economic impacts	
Nature of impact	3.4.7.2.6 Tourism related Impacts	
Legal requirements	None.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Potentially permanent
Intensity	Moderate	Potentially high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Wherever practicable and feasible, construction vehicles should avoid main tourist routes. If possible, the contractor could be obliged (EMP) to liaise with local tourism authorities to ascertain when large tourism tours and events are undertaken. In so doing, construction time-frames and phasing of the roll-out of the construction process could be set in a manner so as <i>not</i> to coincide / interfere with tours/events.</p> <p>It is important for the decisions regarding the location of construction camps to be informed by tourism related imperatives.</p>	<p>To be determined after further investigation, notably of the potential for cumulative impacts. Operation and maintenance time-frames could be determined in a similar manner as discussed under “construction” (◀).</p>

Level of significance after mitigation	Low	Moderate(Motivation: Cumulative impacts remain a concern, even if obvious visual mitigation techniques have been applied).
EMP requirements	Draft provisions to minimise impacts on tourism activity.	Draft provisions to minimise impacts on tourism activity.

Further specialist studies required? Yes: to investigate tourism-site specific impacts due to the transmission line and pylons as well as *en-route* impacts deriving from the presence of the proposed transmission line, including cumulative impacts. The visual impacts are already being investigated as part of the EIA.

Discussion

Tourism presently contributes 10% to the Gross Geographic Product of the Province and is contributing significantly to the economy of the uMzinyathi District and particularly Dundee (Endumeni). A regional Tourism initiative focusing on the “Battlefields” of the area attracts ±39 000 visitors who pass through the area per year⁵. Already in 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift (access road at Pegasus sub-station), the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations⁶.”

Whilst both construction and operation related activity could have an adverse effect on Tourism, it is the pylons themselves with their adverse aesthetic impact that are anticipated to have the most marked impact, potentially rendering the area less attractive. These impacts have the potential to be tourism-site specific, but would also manifest *en-route* to such sites. There is a high probability of cumulative impacts during operation, given that no less than three transmission lines would traverse the study area, creating a more distinguishable ‘footprint’. It would be prudent for Eskom to enter into dialogue with the various local and provincial tourism authorities to address concerns about cumulative impacts and further explore mitigation measures (EMP).

⁵ Source: Bergmaningerop/ Setplan/ Dlodla Development Consortium (2001).

⁶ Mark Wood Consultants (1991).

Section 3-13 (E-H).		
Theme	Socio economic: Farming and agriculture	
Nature of impact	3.4.7.2.7 Management of access routes, fences and gates	
Legal requirements	None	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Long-term
Intensity	Moderate	Moderate, due to potential for cumulative impacts (greater maintenance activity due to a greater number of transmission lines in one study area).
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure (e.g. fences) or stock losses. (Key concern in Section 3-13). ✧ Gates on properties are to be closed after workers have move through them to prevent stock losses and unintended movement of cattle (specifics regarding access control to be finalised on an individual basis). ✧ Choice of access routes and construction approaches to be informed by the imperative to 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure of stock losses (Key concern in Section 3-13). ✧ Gates on properties are to be closed after workers have moved through them to prevent stock losses and unintended movement of cattle. ✧ Choice of access routes to be informed by the imperative to limit/prevent impacts.

	limit/prevent impacts.	
Level of significance after mitigation	Moderate, to low	Moderate, to low
EMP requirements	Approaches and mitigation measures to be made a contract provision, which the proponent/contractors has to comply with.	Provisions are to be drafted to minimise impacts on tourism activity.
Further specialist studies required? No.		
<u>Discussion</u> <p>The management of access routes, fences and gates is specifically important in the farming areas. Specifically construction (and later maintenance/checks) will require use of access routes. This would not only imply an increase in traffic, but also a more rapid deterioration of roads, particularly in areas where erosion⁷ already is a marked problem. Moreover, if workers fail to close gates after moving through them, this would pose a risk in terms of stock losses, unintended integration of rams and ewes, or the ingress of animals from elsewhere.</p>		

⁷ See specialist study on erosion.

Section 3-13 (E-H).		
Theme	3.4.7.3 Health, Safety and Security	
Nature of impact	3.4.7.3.1 Potential increases in fire hazards (management of the servitude area)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate to high	Moderate to high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable
Level of significance	High.	High.
Mitigation measures	Adherence to Eskom's policies on labour camps and work fires should be made a contract provision. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to construction. Access roads could serve as firebreaks.	Sound design and servitude management practices to be applied to minimise impact. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to operation. Access roads could serve as firebreaks. Removal of potential "high fire risk" vegetation types. Strict application of Eskom's fire management policy in conjunction with the individual land owners' fire management plans.
Level of significance after mitigation	Moderate	Moderate

EMP requirements	Include Eskom's policies on labour camps and worker fires as an aspect to be adhered to by the contractor and monitored by the Environmental Officer (EO).	
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Further specialist studies required? No.

Discussion

The practices of construction workers (cooking/heating; stray matches or cigarettes) create a potential for an increase in stray fires. Moreover, the transmission lines could pose a fire risk through sparking. This could exert negative impacts on cultivated land and in terms of the safety of people and animals and may pose a risk to infrastructure and houses. The type of vegetation is seen to be a modulating factor of in respect of the occurrence of this impact.

It is important for a fire/emergency management plan and associated communication channels to be in place, with local fire/emergency teams as key players. It would be important to rehearse such a plan and the functionality/efficacy of communication channels on a regular basis and in conjunction with local emergency/fire fighting teams, to ascertain reaction times and identify snags and weaknesses.

Section 3-13 (E-H).		
Theme	Health, Safety and Security	
Nature of impact	3.4.7.3.2 Perceived safety/security threat	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate	Moderate
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Improbable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ <u>In respect of construction worker safety</u> Put in place health & safety management plans. ✧ <u>In respect of community safety</u> It would be prudent for the main contractor to contact local community organisations to discuss issues of concern in respect of safety and security concerns relating to the presence of construction workers. This should be done before construction commences. Workers deployed in the area should be obligated to wear clothing or identity cards. This would help distinguish them as construction workers and differentiate them from opportunists who may enter the area posing as construction workers 	As during construction / decommissioning.

	and committing crimes. A further suggestion may be for the contractor to brief workers not to enter private properties, requesting water/food or to use ablution facilities.	
Level of significance after mitigation	Low	Low
EMP requirements	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.

Further specialist studies required? No.

Discussion

Two safety consideration are of particular importance:

✧ **Construction worker safety**

There are a number of occupational safety risks associated with transmission line construction, including electrocution risks, risk of falling from working at heights and allied risks normally associated with construction (e.g. falling objects). Compliance with the health and safety legislation would be required.

✧ **Community safety**

Two potential impacts apply in this regard, namely:

- Electrocution risk (people and livestock), particularly because of structural failure of pylons and transmission lines or tampering.
- Safety and security threats posed by the presence of the construction camps/workers. Experience shows that locals readily attribute increases in theft and other crimes to the presence of construction workers, particularly if these workers are from elsewhere.

Section 3-13 (E-H).		
Theme	Health, Safety and Security	
Nature of impact	3.4.7.3.3 Health impacts (HIV/AIDS)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	N/A
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	N/A
Intensity	Moderate	N/A
Probability of occurrence	Probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	High	N/A
Mitigation measures	<ul style="list-style-type: none"> ✧ Oblige contractor to ensure that workers are educated on HIV/AIDS and that condoms are distributed within the construction camp. In this regard, the contractor could liase with the local health services to ensure that their education/condom distribution programmes extend to the construction camps. ✧ Careful consideration should be given to construction camp location vis a vis denser settlements. 	N/A
Level of significance after mitigation	Uncertain	N/A

EMP requirements	Health education/condom distribution could be written into the EMP as a provision that the contractor needs to comply with.	N/A
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>An increase in sexually transmitted infections (STIs) and HIV/AIDS is increasingly being recognised as a tangible risk associated with construction camps. Workers are separated from their families, and it is not uncommon that construction camps are frequented by local sex workers. It must be recognised that this impact has two dimensions in that contractors can infect sex workers and <i>vice versa</i>. It is estimated that over one million adults are currently infected – the KZN Province having the highest rates of HIV infection in the country⁸.</p>		

⁸ Source: Bergmaningerop/ Setplan/ Dlodla Development Consortium (2001).

Section 3-13 (E-H). Social impact focal points: F/G 8 (north) (dwelling(s)); G10/11 (south) (dwelling(s)); G6 & G12 (south) (schools close to proposed southern alignment).		
Theme	Health, Safety and Security	
Nature of impact	3.4.7.3.4 Electromagnetic field (EMF) health risks	
Legal requirements	None.	
Stage	N/A	Operation
Extent of impact	N/A	Local
Duration of impact	N/A	Permanent
Intensity	N/A	Low (North) Low (South). (No significant population presence in close proximity to any of the proposed alignments).
Probability of occurrence	N/A	Highly probable.
Status of the impact	N/A	Negative
Cumulative Impact	N/A	Uncertain
Level of significance	N/A	From a perceptual orientation, potentially high. Precautionary measures: highly significant (see below).
Mitigation measures	N/A	The following recommendations have been formulated by the WHO ⁹ : <ul style="list-style-type: none"> ✧ Strict adherence to existing national or international safety standards, based on current knowledge to protect everyone in the population with a large safety factor. ✧ Simple protective measures: creation of barriers und strong electromagnetic field sources to help preclude unauthorized access to areas where exposure limits may

⁹ WHO, 2001a.

		<p>be exceeded.</p> <ul style="list-style-type: none"> ✧ Consultation with local authorities and the public in siting new power lines. Siting decisions are required to take into account aesthetics and public sensitivities. ✧ Open communication during the planning stages to create public understanding and greater acceptance of a new transmission line or facility and to reduce any mistrust and fears.
Level of significance after mitigation	N/A	Potentially low.
EMP requirements	N/A	Include WHO precautionary recommendations.
<p>Further specialist studies required? Investigations of a technical nature by Eskom regarding EMFs seem warranted and could feed into the work of the WHO EMF agency.</p> <hr/> <p><u>Discussion</u></p> <p>Magnetic fields that naturally emanate from sources such as transmission lines are directly proportionate to the amount of current flowing on the transmission line at any given time. A higher loading condition, such as may be present in hot weather summer months, will result in increased magnetic field levels¹⁰.</p> <p>According to the World Health Organisation (WHO)¹¹, it has become increasingly unlikely (based on the existing body of research) that exposure to EMFs constitutes a serious health hazard, although some uncertainty remains. The WHO's statement derives from a study by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (June 2001), which, using the standard IARC classification that weighs human, animal and laboratory evidence, classified ELF magnetic fields as <i>possibly carcinogenic to humans</i> based on epidemiological studies of childhood leukaemia.</p>		

¹⁰ Source: Munderloh, Hiles & Griffing (2001).

¹¹ WHO, (2001b).

Evidence for all other cancers in children and adults, as well as other types of exposures (i.e. static fields and ELF electric fields) was considered not classifiable either due to insufficient or inconsistent scientific information. "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. This is the weakest classification of three categories ("*is carcinogenic* to humans", "*probably carcinogenic* to humans" and "*possibly carcinogenic* to humans") used by IARC to classify potential carcinogens based on published scientific evidence. EMFs fall in this classification category together with Coffee, Styrene, Gasoline engine exhaust and Welding fumes. The WHO further notes that whilst research continues, an analysis of the balance between cost and potential hazards is essential.

The proximity of the line to residential areas appears to play a role in terms of EMF impacts actually manifesting. Given non-significant population presence within this section of the study area, the impact is rated low across the board. (See potential social impact focal points at top of table).

Section 3-13 (E-H).		
Theme	Health, Safety and Security	
Nature of impact	3.4.7.3.5 Use of creosote poles	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Temporary (long-term health impacts possible).	Very short-term, and subject to the need to restring lines during maintenance.
Intensity	Moderate	Low
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Probable ¹² (from a health perspective if the same workers are repetitively exposed to creosote poles during multiple construction processes).	Unlikely (unless same maintenance workers have been in repetitive contact with creosote poles during multiple construction and maintenance processes).
Level of significance	Potentially high	Low
Mitigation measures	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation 	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation
Level of significance after mitigation	Potentially low.	Potentially low.

¹² Not within the context of this project, but across projects.

EMP requirements	Yes, handling procedures and areas of storage; health and safety standards; pole specifications and ground remediation methods should be presented in the EMP.	Yes, handling procedures, health and safety standards, pole specifications and ground remediation methods should be presented in the EMP.
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Further specialist studies required? No.

Discussion

IPCS Inchem (Canadian Centre for Occupational Health and Safety) cites a study on the development of skin cancer in workers exposed to creosote. This study involved a review of 3753 cases of cutaneous epithelioma from 1920 to 1945 and showed that 35 cases (12 of which were of the scrotum) had had exposure to creosote. Most cases occurred in workers handling creosotes or creosoted wood during timber treatment. A mortality analysis of workers in many occupations indicated an increased risk of scrotal cancer for creosote-exposed brick-makers. The overall evaluation states that: "creosotes are probably carcinogenic to humans". Creosotes and creosote oils were also tested for carcinogenicity in mice by skin application, producing skin tumours, including carcinomas. One of the creosotes also produced lung tumours in mice after skin application.

In respect of the proposed transmission line construction process it should be noted that, whilst construction workers will handle poles, only a limited number of poles will be erected. This will be limited to the stringing process where transmission lines span roads. These temporary structures will be dismantled within approximately two weeks thus limiting the potential for contamination. However, cumulative impacts are probable, with the construction activity of this proposed project playing a contributory role.

Section 3-13 (E-H).		
Theme	3.4.7.4 Intrusion impacts	
Nature of impact	3.4.7.4.1 Increase in noise pollution	
Legal requirements	Consider regulations on acceptable noise levels.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	Permanent
Intensity	Moderate, to low (Residential proximity and the properties of the noise sources serve as modulating factors).	Low to negligible.
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Moderate to low (Population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors).
Mitigation measures	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land-owners. Moreover, blasting time-frames should be made available to locals well in advance so that livestock can be secured and people have 	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land-owners. Moreover, blasting time-frames should be made available to locals well in advance so that livestock can be secured and people have the chance to vacate the area.

	the chance to vacate the area. ✧ Construction camp workers should be instructed to limit recreation-related noise (music), particularly at night and over weekends.	
Level of significance after mitigation	Potentially low	-
EMP requirements	Specify attenuating measures in respect of construction related noise impacts.	N/A

Further specialist studies required? No, to be addressed in EMP.

Discussion

The chief noise related impacts are anticipated to be emanating from construction / construction camp activity. Moreover, the transmission lines may exude a buzzing/humming noise, which is only perceptible when in close proximity to the lines. Studies have found a reliable correlation between a sound's intensity and the number of people who reported getting annoyed. Sounds below 50 decibels (such as the hum of a fridge or air-conditioner) appear to annoy few people, whereas more are bothered by sound over 70 decibels (e.g. a vacuum cleaner) or, worse still, a pneumatic drill (120 decibels+)¹³. Moreover, habituation readily takes place once an intrusive stimulus loses its novelty value, thus no longer eliciting orientation responses (OR) and not inducing cardiovascular reactivity (heart rate and blood pressure changes) normally associated with such arousal¹⁴.

In view of the above, noise generated by construction and construction camp related activity is anticipated to have more annoying properties than the hum/buzz of transmission lines. This is the case because the qualities of the former can vary in terms of incidence, nature and intensity, thus having novel properties and the potential to elicit an orientation response facilitated by physiological arousal. Given the temporary nature of the noise intrusion, long-term cardio-vascular or gastrointestinal disorders are therefore not expected to result. Residential proximity is also considered a modulating factor and population densities are important from the perspective of significance and intensity.

¹³ Source: Kimble, 1990.

¹⁴ Source: Brügge, 2001.

Section 3-13 (E-H).		
Theme	Intrusion impacts	
Nature of impact	3.4.7.4.2 Increase in dust pollution	
Legal requirements	Consider regulations on dust pollution	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Perhaps during maintenance & inspection.
Intensity	Low to Moderate(Residential proximity and population densities serve as modulating factors).	Low to negligible.
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Low (Residential proximity and population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors).
Mitigation measures	Spray roads within the area, access roads and areas where vegetation has been removed for construction purposes with water to suppress dust	-
Level of significance after mitigation	Low	Low
EMP requirements	Specify mitigation measures regarding dust suppression in EMP.	Specify mitigation measures regarding dust suppression in EMP.
Further specialist studies required? No, to be addressed in EMP.		

Discussion

The chief dust generating impacts are expected to emanate from construction activity and to a very minimal extent during operation and maintenance / checking of the transmission line. Residential proximity and population densities are key modulating factors in respect of intensity.

Section 3-13 (E-H).		
Theme	3.4.7.5 Well-being	
Nature of impact	<i>Impacts in respect of sense of place, aesthetic quality and visual impacts</i>	
Legal requirements	None.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Permanent
Intensity	Low	Moderate
Probability of occurrence	Low	Highly probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Low	High
Mitigation measures	Limit negative impacts of construction camp(s).	Design mitigation. Mitigation measures to be informed by visual impact specialist and property owners.
Level of significance after mitigation	Low	Moderate
EMP requirements	Mitigation measures.	Mitigation measures.

Further specialist studies required? No, to be addressed in EMP.

Discussion

In evaluating impacts relating to 'sense of place' and 'aesthetic quality', it has to be considered that it is not the objects or places that matter, but the *meaning* they have for the person interacting with his/her environment. How people perceive their world and the distinctions they draw (their mental 'maps' and narrative used to describe them) are influenced not only by mindset, preferences, attributed emotions and history, but is also subject to cultural influences and collective meaning. Within the context of the latter, it is probably fair to state that transmission lines and power pylons are generally not aesthetically pleasing and would influence the sense of place. This is particularly the case, given the proliferation of such infrastructure and the concomitant probability of cumulative impacts. The presence of three transmission lines in one area in particular would make it more difficult *not* to notice them, when visually scanning the area or when mentally articulating ones 'sense of the place' and describing it to others.

In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that, "our concerns are...specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations¹⁵. (See specialist study on visual impacts).

The property owners consulted in this section of the study area (both north and south), have not raised concerns regarding sense of place, aesthetic quality or visual impact, potentially warranting a low impact rating. The moderate intensity rating, however, serves to account for visual impact related concerns raised by the Monuments Council.

¹⁵ Mark Wood Consultants (1991).

Section 3-13 (E-H). Specific impact focal points: G11 (south) (Church grounds & outbuildings).		
Theme	3.4.7.6 Sites of religious, cultural, historical or archaeological significance	
Nature of impact	<i>Destruction of sites of religious, cultural, historical or archaeological significance</i>	
Legal requirements	Archaeological sites are protected by the National Heritage Resources Act 25 of 1999. It is an offence to destroy, damage, excavate, alter or remove from its original position, or collect and archaeological material without a permit issued by the South African Heritage Resource Agency. Note must also be taken of the National Heritage Council Act, 11 of 1999.	
Stage	Construction	Operation
Extent of impact	Local	Operation
Duration of impact	Construction	Local
Intensity	Potentially high.	Long-term
Probability of occurrence	Possible	Potentially high
Status of the impact	Negative	Probable
Cumulative Impact	No	Negative
Level of significance	High	High (proliferation of pylons and transmission lines in a historically significant area).
Mitigation measures	A full list of sites and routes of archaeological, cultural and historical significance must exist prior to final route determination and construction. A specific set of mitigation measures as well as permits and negotiated agreements must be in place.	High
Level of significance after mitigation	To be determined by specialists after completion of the study and to be informed by negotiations and permit provisions. (See also discussion below).	As during construction.

EMP requirements	Include provisions of relevant Acts; Construction mitigation; potential relocation/compensation. Consultation prior to finalisation of route alignment and construction (affect parties; KZN Monuments Council).	Yes: Provisions of relevant Acts; Construction mitigation; potential relocation/compensation. Consultation prior to finalisation of route alignment and construction (affect parties; KZN Monuments Council).
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Further specialist studies required? Yes.

Discussion

In the case of the Church and outbuildings (G11)(south), factors such as access by the current congregation and its other social functions to the target community must be kept in mind when finalising the route alignment or in the case of relocation. Prior consultation is advisable to explore mitigation measures, the construction time-frames and relocation/compensation related issues (if applicable) with affected parties. The provisions of the National Heritage Resources Act 25 of 1999 (if applicable) should also be considered.

In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift, the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations¹⁶”.

¹⁶ Mark Wood Consultants (1991).

3.5 Section 14–41 (A-H)

3.5.1 General description of the area

The area is characterised by undulating land, resulting in a more dense population count in the northern areas of the Nquthu Municipality area than the steeper slopes of the southern areas. The Nquthu Municipality consist of seven tribal areas, namely: Molefe, Khiphinkunzi, Zondi, Mangwe Buthanani, Mbokodwebomvu, Emandleni and Vulindlela-Sithole. There are approximately twenty primary schools and nine secondary schools in the study area.

Form the above it is evident that this section differs quite dramatically from the previous one, which is an important consideration in terms of social impacts, affecting intensity and significance ratings, amongst others.

3.5.2 Demographic characteristics

The topography, soil potential for agriculture and access to physical and social infrastructure in the area leads to the dispersed settlement patterns with more densely populated urban nodes such as Nquthu and Nondweni. Nquthu serves the rural population located in Ndindini, Izicole, Luvisi, Zinkondlwaneni, Ucilamehloe, Gubazi, Mfangomfango, Khaylisha, Sunrise, Mndeni, Ezibomvu and Dunusu (Nquthu IDP). Nondweni on the other hand only serves the rural population in Odudela, Manyongazana, Othaka, Mahlungulu and Nkunyana.

The population is therefore distributed throughout the area comprising an average density of 88,5 per square kilometre. The total population is estimated at 128 823 people in the Nquthu Municipality area.

3.5.3 Land-use profile

The land is cultivated for commercial use and dryland subsistence farming (livestock and crops such as maize and beans), with numerous degraded areas amid these. In the northern areas of the Nquthu Municipality area the main land-use is livestock farming. To the south of the town of Nquthu an exotic forest plantation exists.

Tourist attractions in the greater area include historical battle sites such as Isandlwana, Rorke's Drift, Prince Imperial, Blood River, Fort Marshall and Fort Newdigate.

3.5.4 Infrastructure en-route

The proposed Transmission line route crosses the R68, which is the main route through the Nquthu area, near the town of Nqutu, as well as the road passing to the east of Nondweni linking Vryheid with the R68.

The area is characterised by inadequate higher learning and health facilities. Nquthu town and Nondweni receive their electricity supply from a sub-station at Vant's Drift and telephone systems are present in the larger centres.

3.5.5 Socio-economic characteristics

Women are generally responsible for farming and overseeing the domestic units, as the economically active men in the area are employed outside the municipality area. A large number of the employed residents in the southern portion of the Nquthu area are working in the Endumeni (Dundee) area, whereas residents in the northern and eastern portions seek employment opportunities in Vryheid (e.g. in the engineering, industrial and commercial sectors). A high unemployment rate is evident, especially in the rural areas. The main economic activity in the Nquthu Municipality is focused on the services sector due to the government institutions in the municipality, followed by the mining and quarrying, as well as agriculture, forestry and fishing sectors.

There appears to be significant reliance on pensions. Due to problems with pension payouts, a large number of people have left the Nquthu area.

3.5.6 Issues/impacts

- ✧ Inflow and outflow of temporary workers.
- ✧ Relocation of individuals and families and related social impacts.
- ✧ "Khonza" fee (relocation administration fee) and cost of dwellings.
- ✧ Socio-economic impacts
- ✧ Disruption of farming activity (including impact on unintended livestock movement).
- ✧ Management of access routes, fences and gates.
- ✧ Loss of residential/agricultural land.
- ✧ Social problems due to construction camps and construction worker activities.
- ✧ Disruption of infrastructure and services.
- ✧ Health, safety and security risks e.g. fire risks, worker and community safety and spread of diseases such as HIV/AIDS.

- ✧ Tourism impacts.
- ✧ Intrusion impacts
- ✧ Impact on sense of place and aesthetic quality.
- ✧ In Ngwetshane area (G20-21), Kwangedle area (F27) and Witklip area (D38) the proposed route would pass near primary schools.

3.5.7 Social Impact Assessment

The social impact assessment per section is set out in the table below.

Table 3-2: Social Impact Assessment Tables: Section 14-41 (A-H)

Section 14-41 (A-H)		
Theme	3.5.7.1 Population Impacts	
Nature of impact	3.5.7.1.1 Inflow and outflow of temporary workers	
Legal requirements	None	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction / decommissioning	Intermittent (maintenance)
Intensity	Moderate to high (Proximity of construction camps to communities is an important modulating factor in terms of impact intensity).	Low
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Not applicable	Negligible
Level of significance	Moderate, to high (Higher high population densities and potential proximity to communities, particularly along northern alignment).	Low (Nature and extent of activity required for operation/maintenance more constrained than during construction per se).
Mitigation measures	<p>✧ The conduct of contract workers would have to be specified in construction camp management plans, including use and management of sanitation, water and waste as well as informal trading, running shebeens and interfering in local community/cultural affairs. A peer-group based incentive/fine scheme has been implemented successfully in other projects to help ensure compliance. Before commencement of construction, a bonus (e.g. R 30 000) is</p>	Not applicable.

	<p>allocated to the workers and a fine system instituted. Compliance/transgressions are monitored by the Environmental Officer, the local community/property owners and fellow workers. Every transgression carries a fine (e.g. R 30.00 for littering; R 120.00 for lighting a fire at a spot not demarcated for this purpose). These fines are subtracted from the bonus and the balance is split between workers at the end of the construction period. All transgressions are displayed in the site-office together with the name of the 'offender'. The idea of this system is to promote peer-group monitoring and penalising. This is usually effective, as all would benefit from keeping the bonus at the maximum.</p> <ul style="list-style-type: none"> ✧ If at all possible, avoid setting-up construction camps in close proximity to larger communities like Nhlati, Jabavu, Ntshongweni, Ngwetshane, Kwagedle, Ndindini, Nquthu, Maduladula and Ndondweni (and its environs). ✧ Consult with, and inform affected parties (notably the Amakhosi) of the construction program; who will be responsible for what; proposed positioning of construction camps and the extent of worker inflow and outflow. 	
Level of significance after mitigation	Moderate	Low
EMP requirements	Contract compliance with EMP and monitoring of	...(as per construction & decommissioning)

	compliance.	
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Discussion

Given the specialist nature of transmission line construction, outside specialist contractor teams¹⁷ will be deployed. The nature, extent and impact of this variable will depend on possible disruptions/intrusion/environmental impacts due to the presence of contractors (whether local or not) as well as potential clashes due to differences in racial and ethnic composition between locals and outside contractors.

The presence of contractors and construction camps *per sé* is associated with a number of social and environmental problems, particularly in the wake of poor construction camp management practices. Such problems can include the erection of informal dwellings and allied problems such as lack of water, sanitation and waste disposal infrastructure, with concomitant health, environmental pollution and aesthetic impacts. In the rainy season, surface water run-off can result in faeces being washed into streams, posing health risks elsewhere. (The recent cholera epidemic in the Province is still fresh in everyone's mind). These problems can be exacerbated in the event of an in-migration of job-seekers from elsewhere, who may set-up informal dwellings in the vicinity of the construction camps. The probability of this occurring is, however, slight, given the limited potential for employment. Moreover, it is common practice for local informal vendors (notably women providing cooked food) to enter the area, given the new business opportunity provided by the construction workers.

The Amakhosi consulted have expressed the need to be informed of the construction program/time-frames and who will be doing what. They would not like to see people moving around their areas without knowing who they are and what they are doing. Concerns were raised about the 'attitude' of contractors who are ostensibly only concerned about completing their tasks ('time is money').

¹⁷ Refer to section on employment equity, job creation and training.

Section 14-41 (A-H). Specific impact focal points: E15, E18, E19, D22, B23, C27/28, C28/29, C32, B34, C34, B35, B39, B40, cross-over point (north) (dwelling(s)). G20, G21, F24, F28, E32, E34, D36, D39 (south) (dwelling(s)).		
Theme	Population Impacts	
Nature of impact	3.5.7.1.2 Relocation of Individuals and Families¹⁸	
Legal requirements	Consider the Constitution, Section 24(1), Expropriation guidelines. Traditional law.	
Stage	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Permanent (spatial); Psycho-social (see discussion below).	See discussion below.
Intensity	High (north); moderate, to high (south).	High (north); moderate, to high (south).
Probability of occurrence	Highly probable	Highly probable
Status of the impact	Negative	Negative
Cumulative Impact	Not applicable	Not applicable
Level of significance	High	High
Mitigation measures	<ul style="list-style-type: none"> ✧ Align route in a manner so as to limit the extent of relocation. ✧ Compensation for re-settlement and loss of dwelling and/or land. 	As during construction/decommissioning.
Level of significance after mitigation	Potentially moderate	Potentially moderate

¹⁸ Rating informed by anticipated extent of relocation, should the proposed transmission line follow a route closely aligned with the existing Athene-Pegasus and Pegasus-Umfolozi transmission lines. Dwellings on northern alignment digitally captured.

EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)
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Discussion

According to the Amakhosi consulted¹⁹, ESKOM would be expected to pay a compensation amount to the affected homeowner and an administration fee (so-called *Khonza fee*) would accrue to the iNkosi. Moreover, Eskom would be responsible for relocation process, although the Amakhosi would attend meetings to get more information on the proceedings. According to the Amakhosi, traditional Zulu houses and kraals are more expensive than the ordinary houses. Consequently, a mechanism of evaluating costs involved in the process would be required.

It would be important for Eskom to be mindful of factors such as the current economic base of the inhabitants; the possible need to relocate ancestral graves and other considerations such as access to transport, schools and other social services. It is important to consider that any significant change requires adaptive capacity by those who face relocation. (Relocation is recognised as a source of stress on life events scales). The ability to adapt to change is dependent on the psychological make-up of the individual; the nature and extent of the change as well as the degree to which social support is available within the family and community as well a break with current social networks. The factors must be understood within the context or more tangible considerations such as ability to make a living in the newly allocated area, and being able to access current places of work without incurring major transport expenses or having to travel greater distances. (This could have other impacts such as reduced recreation and family time.

¹⁹ Minutes of Focus Group meeting held with the Amakhosi on the 15 November 2001 at Nqutu Municipal Office.

Section 14-41 (A-H). Impact focal points: E/F15,16,17,18; D21,23; B23,27,28; C23,29,31,32,33,34,35; C/D25,26;27,28; D22,23; B31,32,33,34,35,40; cross-over point (north)(communities). H15,16,18,19; F23,27,28,30,31,35,36 (south) (communities).		
Theme	Population Impacts	
Nature of impact	3.5.7.1.3 Disruption of social networks and daily movement patterns	
Legal requirements	None.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	High (north) (Motivation: High population density); Moderate, to low (south) (Motivation lower population density).	Moderate, to low (Motivation: Relatively low frequency and extent of maintenance and inspection activity if compared to construction phase).
Probability of occurrence	Highly probable	Probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Possible (Motivation: Higher rate of maintenance and inspection activity due to the presence of three transmission lines in the study area:- Athene-Pegasus; Pegasus-Umfolozi(1) and Pegasus-Umfolozi(2))
Level of significance	High (north); Moderateto low (south).	Low
Mitigation measures	<p>✧ <u>Disruption of existing social networks:</u> Mitigation of this impact is not readily achievable, as the contractor cannot readily be held accountable for worker conduct outside of working hours. It would, nevertheless be prudent for the contractor to encourage sensible conduct among workers, particularly as alcohol use, interference in local</p>	

	<p>networks and unsustainable relationships are concerned.</p> <p>✧ <u>Disruption of daily movement patterns:</u> (See EMP requirements below).</p>	
Level of significance after mitigation	Moderate	Moderate
EMP requirements	<p>Stipulate measures such as:</p> <ul style="list-style-type: none"> ✧ Strict adherence to speed limits when using local roads. ✧ Disciplinary action for reckless and drunk driving. ✧ Strict enforcement of policies regarding the use of construction vehicles for private use over weekends (e.g. to visit shebeens; to transport locals, etc.). ✧ Registration of a road servitude to access construction terrain. ✧ Limiting use of local roads before schools start and at the end of the school day. <p>There is little doubt that a monitoring function would have to be performed in respect of the above. This role could be fulfilled by the Environmental Officer, although community involvement²⁰ in monitoring is desirable. For example, a toll-free complaints number could be posted across the construction area for use by the community. Co-operation with</p>	As during construction.

²⁰ **Note:** All communication with the community would have to take place via the Amakhosi.

	local traffic law enforcement agencies would be important to ensure compliance with traffic legislation.	
Further specialist studies required? No.		
<p><u>Discussion</u></p> <ul style="list-style-type: none"> ✧ <u>Disruption of existing social networks:</u> In view of being separated from their families, it is common for construction workers to engage with local communities. Short-term, unsustainable relationships with local women can result, with social consequences (e.g. unwanted pregnancies) manifesting long after construction workers have left the area. Unbecoming and unruly conduct of workers seeking recreational opportunities in local communities is another potential source of social conflict with the potential to disrupt social networks. ✧ <u>Disruption of daily movement patterns:</u> Construction related vehicular movement has the potential to disrupt the daily movement patterns of the local population and poses safety risks for children walking to primary schools in the area. (Sections of note: schools). The point of access to the construction terrain from main access road(s) is a potential impact focal point. 		

Section 14-41 (A-H).		
Theme	3.5.7.2 Socio-economic impacts	
Nature of impact	3.5.7.2.1 Employment equity; job creation and training	
Legal requirements	The following Acts should be considered: Basic Conditions of Employment Act 75 of 1997; Skills Development Act 97 of 1998; Labour Relations Act 66 of 1995; Employment Equity Act 55 of 1998; and Government's Preferential Procurements Act of 1999.	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	High (negative): Lack of employment equity. Low (positive): Job creation.	High (negative): Lack of employment equity. Little to no positive impact in regard to job creation.
Probability of occurrence	Probable (negative & positive impacts).	Probable (negative and positive impacts).
Status of the impact	Ranging from Negative to Positive	Ranging from Negative to Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	High	High
Optimisation measures (job creation).	The key <i>optimisation</i> measure is to ensure that locals (individuals; SMMEs) with the relevant skills/expertise are employed for construction. This would necessitate the creation of a labour desk as well as a skills audit to identify skills levels and determine training requirements. Multi-skills training would be sensible to ensure that skills are transferable and employment sustainable. It may	Same optimisation measures as during construction and decommissioning apply, with the exception that the focus is operation and maintenance.

	<p>be prudent to put in place standardised communication and dispute resolution procedures in respect of employment creation and training.</p> <p>The above would have to be standardised in the form of a contract provision, specifying input (training and job-creation plans) and output key performance indicators (actual evidence that local contractors & labour is being used).</p>	
Level of significance after mitigation	Moderate to low (in respect of job creation).	High (lack of equity relating to the specialised component of the maintenance process cannot be mitigated). Job creation marginal to non-existent during operational phases. Mitigation thus of limited consequence.
EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)

Discussion

Employment equity refers to the extent to which the local skills match the requirements of the project proponent during construction, operation and decommissioning or, put differently, a lack of employment equity refers to a mismatch between local skills and the requirements of the proponent. This variable ranges from negative to positive. The *negative rating* serves to account for the specialised components of transmission line construction, which locals would not be able to undertake, despite training. This (main) component of the work is exclusively the domain of specialists. The high intensity rating is commensurate with the expected higher demand for jobs in areas of higher population density (notably northern part of study area), thereby pulling into sharper focus the issue of equity.

The *positive rating* serves to account for the job creation and training, which can readily be allocated to contractors/ SMMEs by the main contractor. The optimisation measures discussed above serve to 'unlock' the positive impacts. *Job creation is a particularly pressing imperative, given the high unemployment rates.* According to the IDP, the predominance of females has resulted in a weak economy, which may point to the need to focus on women when undertaking recruitment drives.

An allied consideration in terms of this impact variable is that of potential conflict between locals as well as locals and outsiders. In this regard, it is important to consider that jobs are a scarce commodity. Introducing such a commodity into a resource-starved environment by itself has the potential to create competition as people attempt to secure this scarce commodity, hence the need for dispute resolution.

Section 14-41 (A-H).		
Theme	Socio-economic impacts	
Nature of impact	3.5.7.2.2 Improved national, regional and local economy	
Legal requirements	None. (Provisions of the Development Facilitation Act to be considered).	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Low (positive)(local: economic spin-offs).	High (positive)(regional/national).
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Positive	Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Consider the socio-economic strategies of the Integrated Development Plans for the uMzinyathi District with a view to maximising local economic spin-offs. ✧ Promote procurement of local building materials and services (backward linkages) for use during construction. ✧ Promote use by contractors of local service industries (e.g. accommodation) and visitation of tourism attractions. 	Maximise use of local raw materials, goods and services through deliberate local affirmative procurement policies and strategies.

Level of significance after mitigation	High	High
EMP requirements	Not applicable.	Not applicable.
Further specialist studies required? Yes, quantification of economic spin-offs at the local, regional and national level.		
<p><u>Discussion</u></p> <p>It is evident that there will be <i>limited</i> direct benefit to local communities as a result of the new transmission line. Both the inflow of contractors as well the increased income level of locals who would secure employment during construction and operation is anticipated to have local economic spin-offs. It must, however, be noted that any new transmission line does not infer a tariff increase to local electricity supply. These tariffs are set independently by the local distribution authority (e.g. Municipality). It would be important to maximise positive economic impacts through deliberate directives set-out in the contract between the project proponent and contractor. This is particularly the case given the shortage of work, which has seen many inhabitants migrating to cities in search of work. Moreover, indications are that the social structure has, over the years, changed substantially and the primary form of income for many of the residents of the Nquthu area, is derived from pension payouts.</p> <p>The new transmission line is also anticipated to have a favourable economic impact at regional and national level, given that it would meet demand for additional electricity in the Richards Bay area. This area and its surrounds continue to show significant growth as an industrial centre in South Africa, and recently proposed developments are anticipated to result in a greater demand being placed on the electricity grid.</p> <p>It is important that Eskom considers in its planning the Integrated Development Plan for the uMzinyathi District, the Nqutu Council and the Endumeni (Dundee) Council. The Endumeni Council has appointed the Bergmaningerop/ Setplan/ Dludla Development Consortium to prepare an Integrated Development Plan (IDP) for the District as well as Endumeni. The firm Scott-Wilson, in turn, is responsible for the Nqutu IDP.</p>		

Section 14-41 (A-H).		
Theme	Infrastructure/Socio-economic impacts	
Nature of impact	3.5.7.2.3 Disruption of farming activities	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Temporary	Potentially permanent
Intensity	Moderate	Potentially high
Probability of occurrence	Highly Probable	Highly probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Possible
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Close coordination with the Amkhosi and affected farmers is required to glean more information on farming-related activities and time-frames (planting; harvesting). Where possible, constructing activity and roll-out of the program should be responsive to the imperatives of the farmers.</p> <p>It would also be prudent to involve farmers/property owners and their representative organisations (e.g. Farmers'/Agricultural Unions) in discussions regarding construction activity, mitigation measures (including route alignment) as well as procedures in the case of compensation for maintenance; stock and crop losses.</p>	As during construction, with the addition that land-owners and the relevant authorities would have to be informed of maintenance activities in advance.

	The above should be included in the contractual provisions set by Eskom for the contractor.	
Level of significance after mitigation	Moderate to low	Moderate to low
EMP requirements	<p>Stipulate mitigation measures such as:</p> <ul style="list-style-type: none"> ✧ Which existing roads can be used; ✧ Due process to be followed if additional access is required; ✧ Due process to be followed if life-stock is to be moved away from the construction terrain; ✧ Speed limits on local roads; ✧ Conduct by workers on-site (including closing of gates); ✧ Rehabilitation after completion of the construction process. <p>Monitoring of compliance in respect of the above would be required. (Expressed request by the Amakhosi).</p>	As during construction
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>In cultivated areas, construction and operation and to a lesser extent, decommissioning activities could exert a negative impact on farming activities (e.g. harvesting and irrigation; movement/access of tractors/trucks) and result in crop destruction. Clearance of land to facilitate construction and increased use of local roads (maintenance) and/or the creation of additional access roads (erosion risk), as well as livestock loss due to gates being left open by workers, could have financial implications for farmers. Similar impacts could result from maintenance activity during operation, when workers would have to access properties. An allied consideration is the potential restriction on growth and harvesting of crops in the servitude.</p>		

Section 14-41 (A-H). Specific impact focal points: Subsistence and commercial farming areas (C31).		
Theme	Socio-economic impacts	
Nature of impact	3.5.7.2.4 Loss of land or agricultural land-use	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Potentially permanent
Intensity	Potentially high	Potentially high
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on residential and agricultural land. ✧ Route planning to be mindful of the objective to minimise economic losses, particularly in the case of subsistence farming areas. 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on residential and agricultural land. ✧ Route planning to be mindful of the objective to minimise economic losses.
Level of significance after mitigation	Moderate	Moderate

EMP requirements	<ul style="list-style-type: none"> ✧ Formal land negotiation process with directly affected property/land owners; ✧ Limit construction, decommissioning and operation/maintenance 'intrusions'. ✧ Limit impact through route alignment adjustments (where feasible and practicable). 	As during construction/decommissioning.
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Further specialist studies required? Yes, quantification of potential losses to be done one a property-specific basis once final route alignment has been determined).

Discussion

In this section, there are pockets of cultivated land (including commercial farming areas), which the proposed transmission line traverses. Whilst land-owners may not erect or build infrastructure under the lines, most farming activities may continue. A corridor of approximately **50m wide** is required for the servitude of a 400 kV transmission line. The degree of loss of land is subject to the type of pylon to be used and the nature and extent of construction activity. Harvesting may also be disrupted due to the shape and footprint of the power pylon and construction activity. Cumulative impacts are highly probable, as no less than three pylons would traverse the study area, once the current transmission line becomes operational. Depending on the final route alignment, expropriation of land may be required.

In smaller, subsistence farming areas the issue of the footprint of the pylons is more of a concern than in the larger land-holdings. Concerns exist that on small agricultural/grazing holdings, *one pylon has the potential to have a marked negative impact in terms of significantly limiting productive land use*²¹. It is evident that subsistence farming in the area prevails rather than extensive economic practice. Food is sold only in few instances. Bearing in mind this reality as well as the socio-economic conditions, it would be prudent not to place further strains on food source and income-generating potential of the population in rural areas.

²¹ Minutes of Focus Group meeting held with the Amakhosi on the 15 November 2001 at Nqutu Municipal Office.

Section 14-41 (A-H). Specific impact focal points: Significant disruptions along northern section of study area, particularly Vant's Drift, Nquthu and its environs, Nondweni, C31 (subsistence farming) and C40/41 (villages at cross-over point).		
Theme	Socio-economic	
Nature of impact	3.5.7.2.5 Potential disruption of infrastructure and services	
Legal requirements	None.	
Stage	Construction/Temporary	Operation
Extent of impact	Local	N/A
Duration of impact	Construction	N/A
Intensity	Low to potentially high	N/A
Probability of occurrence	Highly probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	Low to potentially high.	N/A
Mitigation measures	Consultations are to be held prior to construction with agencies and individuals whose infrastructure may be affected. Detail maps are required which contain details on surface and sub-surface infrastructure. Construction would have to be planned in a manner to ensure minimal disruption of such infrastructure. In cases where such disruption is inevitable, negotiations would have to be held with affected parties prior to construction to discuss compensations or restoration.	N/A

Level of significance after mitigation	Potentially low	N/A
EMP requirements	Very specific details are to be included on the geographic locality of infrastructure and how this is to be dealt with from a construction perspective.	
Further specialist studies required? No, consultations and negotiations to be held with affected parties once the candidate route has been determined.		
<p><u>Discussion</u></p> <p>There are a number of roads, which traverse the study area, including the R 68 and D-1317, which may be crossed by the proposed transmission line. There are also a number of smaller roads, which the line may cross. Other considerations are telecommunications infrastructure, irrigation systems, and sub-surface pipelines, which could be damaged through construction activity. The resultant disruption in essential services (e.g. water / sanitation / electricity supply) or restricted road use could range in intensity from having mere 'nuisance value' to being more severe. This would typically be the case if commercial enterprises, services to local hospitals, and access to towns and villages were disrupted for extended periods. However, mitigation is readily achievable, thus justifying a post-mitigation 'low significance' rating.</p> <p>Specific impact focal points: Potentially significant disruptions along the northern section of study area, particularly Vant's Drift, Nquthu and its environs, Nondweni, C31 (subsistence farming) and C40/41 (the point where the proposed southern line, if pursued, would cross over to follow a northern alignment).</p>		

Section 14-41 (A-H).		
Theme	Socio-economic impacts	
Nature of impact	3.5.7.2.6 Tourism related Impacts	
Legal requirements	None.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Potentially permanent
Intensity	Moderate	Potentially high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Wherever practicable and feasible, construction vehicles should avoid main tourist routes. If possible, the contractor could be obliged (EMP) to liaise with local tourism authorities to ascertain when large tourism tours and events are undertaken. In so doing, construction time-frames and phasing of the roll-out of the construction process could be set in a manner so as <i>not</i> to coincide / interfere with tours/events.</p> <p>It is important for the decisions regarding the location of construction camps to be informed by tourism related imperatives.</p>	<p>To be determined after further investigation, notably of the potential for cumulative impacts. Operation and maintenance time-frames could be determined in a similar manner as discussed under “construction” (▲).</p>

Level of significance after mitigation	Low	Moderate(Motivation: Cumulative impacts remain a concern, even if obvious visual mitigation techniques have been applied).
EMP requirements	Draft provisions to minimise impacts on tourism activity.	Draft provisions to minimise impacts on tourism activity.
Further specialist studies required? Yes: to investigate tourism-site specific impacts due to the transmission line and pylons as well as <i>en-route</i> impacts deriving from the presence of the proposed transmission line, including cumulative impacts. The visual impacts are already being investigated as part of the EIA.		

Discussion

Tourism presently contributes 10% to the Gross Geographic Product of the Province and is contributing significantly to the economy of the uMzinyathi District and particularly Dundee (Endumeni). A regional Tourism initiative focusing on the “Battlefields” of the area attracts ±39 000 visitors who pass through the area per year²². Already in 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift, the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations²³”.

Whilst both construction and operation related activity could have an adverse effect on Tourism, it is the pylons themselves with their adverse aesthetic impact that are anticipated to have the most marked impact, potentially rendering the area less attractive. These impacts have the potential to be tourism-site specific (focal), but would also manifest *en-route* to such sites. There is a high probability of cumulative impacts during operation, given that no less than three transmission lines would traverse the study area, creating a more distinguishable ‘footprint’. It would be prudent for Eskom to enter into dialogue with the various local and provincial tourism authorities to address concerns about cumulative impacts and further explore mitigation measures (EMP). (See also discussion on sites of cultural, historical and archaeological significance).

²² Source: Bergmaningerop/ Setplan/ Dlundla Development Consortium (2001).

²³ Mark Wood Consultants (1991).

Section 14-41 (A-H).		
Theme	Socio-economic: Farming and agriculture	
Nature of impact	3.5.7.2.7 Management of access routes, fences and gates	
Legal requirements	None	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Long-term
Intensity	Moderate	Moderate, due to potential for cumulative impacts
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure (e.g. fences) or stock losses. ✧ Gates on properties are to be closed after workers have moved through them to prevent stock losses and unintended movement of cattle (specifics regarding access control to be finalised on an individual basis). ✧ Choice of access routes and construction approaches to be informed by the imperative to limit/prevent impacts. 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure of stock losses. ✧ Gates on properties are to be closed after workers have move through them to prevent stock losses and unintended movement of cattle. ✧ Choice of access routes to be informed by the imperative to limit/prevent impacts.

Level of significance after mitigation	Moderate to Low	Moderate to Low
EMP requirements	Approaches and mitigation measures to be made a contract provision, which the proponent/contractors has to comply with.	Draft provisions to minimise impacts on tourism activity.
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>The management of access routes, fences and gates is specifically important in the farming areas. Specifically construction (and later maintenance/checks) will require use of access routes. This would not only imply an increase in traffic, but also a more rapid deterioration of roads, particularly in areas where erosion²⁴ already is a marked problem. Moreover, if workers fail to close gates after moving through them, this would pose a risk in terms of stock losses, unintended integration of rams and ewes, or the ingress of animals from elsewhere. These are particular concerns raised by the Amakhosi consulted during the public participation process.</p>		

²⁴ See specialist study on erosion.

Section 14-41 (A-H).		
Theme	3.5.7.3 Health, Safety and Security	
Nature of impact	3.5.7.3.1 Potential increases in fire hazards (management of the servitude area)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate, to high	Moderate, to high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable
Level of significance	High.	High.
Mitigation measures	Adherence to Eskom's policies on labour camps and work fires should be made a contract provision. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to construction. Access roads could serve as firebreaks.	Sound design and servitude management practices to be applied to minimise impact. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to operation. Access roads could serve as firebreaks.
Level of significance after mitigation	Moderate	Moderate
EMP requirements	Include Eskom's policies on labour camps and worker fires as an aspect to be adhered to by the contractor and monitored by the Environmental Officer (EO).	Include Eskom's policies on labour camps and worker fires as an aspect to be adhered to by the contractor and monitored by the Environmental Officer (EO).

Further specialist studies required? No.

Discussion

The practices of construction workers (cooking/heating; stray matches or cigarettes) create a potential for an increase in stray fires. Moreover, the transmission lines could pose a fire risk through sparking. This could exert negative impacts on cultivated land and in terms of the safety of people and animals and may pose a risk to infrastructure and houses. The type of vegetation is seen to be a modulating factor of in respect of the occurrence of this impact.

It is important for a fire/emergency management plan and associated communication channels to be in place, with local fire/emergency teams as key players. It would be important to rehearse such a plan and the functionality/efficacy of communication channels on a regular basis and in conjunction with local emergency/fire fighting teams, to ascertain reaction times and identify snags and weaknesses.

Section 14-41 (E-H).		
Theme	Health, Safety and Security	
Nature of impact	3.5.7.3.2 Perceived safety/security threat	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate, to high	Moderate, to high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Improbable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ <u>In respect of construction worker safety</u> Put in place health & safety management plans. ✧ <u>In respect of community safety</u> It would be prudent for the main contractor to contact local community organisations to discuss issues of concern in respect of safety and security concerns relating to the presence of construction workers. This should be done before construction commences. Workers deployed in the area should be obligated to wear clothing or identity cards. This would help distinguish them as construction workers and 	As during construction / decommissioning.

	differentiate them from opportunists who may enter the area posing as construction workers and committing crimes. A further suggestion may be for the contractor to brief workers not to enter private properties, requesting water/food or to use ablution facilities.	
Level of significance after mitigation	Moderate	Moderate
EMP requirements	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.
Further specialist studies required? No.		

Discussion

Two safety considerations are of particular importance:

✧ **Construction worker safety**

There are a number of occupational safety risks associated with transmission line construction, including electrocution risks, risk of falling from working at heights and allied risks normally associated with construction (e.g. falling objects). Compliance with the health and safety legislation would be required.

✧ **Community safety**

Two potential impacts apply in this regard, namely:

- Electrocution risk (people and livestock), particularly because of structural failure of pylons and transmission lines or tampering.
- Safety and security threats posed by the presence of the construction camps/workers. Experience shows that locals readily attribute increases in theft and other crimes to the presence of construction workers, particularly if these workers are from elsewhere.

Section 14-41 (A-H). Impact focal points: E/F15,16,17,18; D21,23; B23,27,28; C23,29,31,32,33,34,35; C/D25,26;27,28; D22,23; B31,32,33,34,35,40; cross-over point (north)(communities). H15,16,18,19; F23,27,28,30,31,35,36 (south) (communities).		
Theme	Health, Safety and Security	
Nature of impact	3.5.7.3.3 Health impacts (HIV/AIDS)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, provincial (potentially national).	N/A
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	N/A
Intensity	High (Motivation: Higher population densities).	N/A
Probability of occurrence	Highly probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	High	N/A
Mitigation measures	<ul style="list-style-type: none"> • Oblige contractor to ensure that workers are educated on HIV/AIDS and that condoms are distributed within the construction camp. In this regard, the contractor could liase with the local health services to ensure that their education/condom distribution programmes extend to the construction camps. • Careful consideration should be given to construction camp location vis a vis denser settlements. 	N/A

Level of significance after mitigation	Uncertain	N/A
EMP requirements	Health education/condom distribution could be written into EMP as a provision that the contractor needs to comply with.	N/A
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>An increase in sexually transmitted infections (STIs) and HIV/AIDS is increasingly being recognised as a tangible risk associated with construction camps. Workers are separated from their families, and it is not uncommon that construction camps are frequented by local sex workers. It must be recognised that this impact has two dimensions in that contractors can infect sex workers and <i>vice versa</i>. The high intensity rating of this impact in this section is commensurate with the HIV/AIDS infection rate in KwaZulu/Natal. It is estimated that over one million adults are currently infected – this Province having the highest rates of HIV infection in the country²⁵.</p> <p>The higher population densities warrant ‘high’ ratings (significance; intensity; probability) across the board, although construction camp locations (e.g. closer versus distant) would have a potentially mitigating effect or at least modulate the intensity of the impact.</p>		

²⁵

Source: Bergmaningerop/ Setplan/ Dlodla Development Consortium (2001).

Section 14-41 (A-H). Impact focal points: E/F15,16,17,18; D21,23; B23,27,28; C23,29,31,32,33,34,35; C/D25,26;27,28; D22,23; B31,32,33,34,35,40; cross-over point (north)(communities). H15,16,18,19; F23,27,28,30,31,35,36 (south) (communities).		
Theme	Health, Safety and Security	
Nature of impact	3.5.7.3.4 Electromagnetic field (EMF) health risks	
Legal requirements	None.	
Stage	N/A	Operation
Extent of impact	N/A	Local
Duration of impact	N/A	Permanent
Intensity	N/A	Moderate, to high (north). Moderate, to low (south).
Probability of occurrence	N/A	Highly probable.
Status of the impact	N/A	Negative
Cumulative Impact	N/A	Uncertain
Level of significance	N/A	From a perceptual orientation, potentially high. Precautionary measures: highly significant (see discussion below).
Mitigation measures	N/A	The following recommendations have been formulated by the WHO ²⁶ : <ul style="list-style-type: none"> ✧ Strict adherence to existing national or international safety standards, based on current knowledge to protect everyone in the population with a large safety factor. ✧ Simple protective measures: creation of barriers around strong electromagnetic field sources to help preclude unauthorized access to areas where exposure limits may

²⁶ WHO, 2001a.

		<p>be exceeded.</p> <ul style="list-style-type: none"> ✧ Consultation with local authorities and the public in siting new power lines. Siting decisions are required to take into account aesthetics and public sensitivities. ✧ Open communication during the planning stages to create public understanding and greater acceptance of a new transmission line or facility and to reduce any mistrust and fears
Level of significance after mitigation	N/A	Potentially low.
EMP requirements	N/A	Include WHO precautionary recommendations.

Further specialist studies required? Investigations of a technical nature by Eskom regarding EMFs seem warranted and could feed into the work of the WHO EMF agency.

Discussion

Magnetic fields that naturally emanate from sources such as transmission lines are directly proportionate to the amount of current flowing on the transmission line at any given time. A higher loading condition such as may be present in hot weather summer months will result in increased magnetic field levels²⁷.

According to the World Health Organisation (WHO)²⁸, it has become increasingly unlikely (based on the existing body of research) that exposure to EMFs constitutes a serious health hazard, although some uncertainty remains. The WHO's statement derives from a study by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (June 2001), which, using the standard IARC classification that weighs human, animal and laboratory evidence, classified ELF magnetic fields as **possibly carcinogenic to humans** based on epidemiological studies of childhood leukaemia. Evidence for all other cancers in children and adults, as well as other types of exposures (i.e. static fields and ELF electric fields) was considered not classifiable either due to insufficient or inconsistent scientific information.

²⁷ Source: Munderloh, Hiles & Griffing (2001).

²⁸ WHO, (2001b).

"Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. This is the weakest classification of three categories ("*is carcinogenic* to humans", "*probably carcinogenic* to humans" and "*possibly carcinogenic* to humans") used by IARC to classify potential carcinogens based on published scientific evidence. EMFs fall in this classification category together with Coffee, Styrene, Gasoline engine exhaust and Welding fumes. The WHO further notes that whilst research continues, an analysis of the balance between cost and potential hazards is essential.

The proximity of the line to residential areas appears to play a role in terms of EMF impacts actually manifesting. A northern alignment (notably Section 14-41, north) of the transmission line is therefore anticipated to be more problematic, given population densities and the number of populated areas that it may traverse.

Section 14-41 (A-H).		
Theme	Health, Safety and Security	
Nature of impact	3.5.7.3.5 Use of creosote poles	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Temporary (long-term health impacts possible).	Very short-term, and subject to the need to restring lines during maintenance.
Intensity	Moderate	Low
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Probable ²⁹ (from a health perspective if the same workers are repetitively exposed to creosote poles during multiple construction processes).	Unlikely (unless same maintenance workers have been in repetitive contact with creosote poles during multiple construction and maintenance processes).
Level of significance	Potentially high	Low
Mitigation measures	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation 	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation
Level of significance after mitigation	Potentially low.	Potentially low.

²⁹ Not within the context of this project, but across projects.

EMP requirements	Yes, handling procedures and areas of storage; health and safety standards; pole specifications and ground remediation methods should be presented in the EMP.	Yes, handling procedures, health and safety standards, pole specifications and ground remediation methods should be presented in the EMP.
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Further specialist studies required? No.

Discussion

IPCS Inchem (Canadian Centre for Occupational Health and Safety) cites a study on the development of skin cancer in workers exposed to creosote. This study involved a review of 3753 cases of cutaneous epithelioma from 1920 to 1945 and showed that 35 cases (12 of which were of the scrotum) had had exposure to creosote. Most cases occurred in workers handling creosotes or creosoted wood during timber treatment. A mortality analysis of workers in many occupations indicated an increased risk of scrotal cancer for creosote-exposed brick-makers. The overall evaluation states that: "creosotes are probably carcinogenic to humans". Creosotes and creosote oils were also tested for carcinogenicity in mice by skin application, producing skin tumours, including carcinomas. One of the creosotes also produced lung tumours in mice after skin application.

In respect of the proposed transmission line construction process it should be noted that, whilst construction workers will handle poles, only a limited number of poles will be erected. This will be limited to the stringing process where transmission lines span roads. These temporary structures will be dismantled within approximately two weeks thus limiting the potential for contamination. However, cumulative impacts are probable, with the construction activity of this proposed project playing a contributory role.

Section 14-41 (A-H).		
Theme	3.5.7.4 Intrusion impacts	
Nature of impact	3.5.7.4.1 Increase in noise pollution	
Legal requirements	Consider regulations on acceptable noise levels.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	Permanent
Intensity	Moderate, to low (Residential proximity and the properties of the noise sources serve as modulating factors).	Moderate, to low (residential proximity/characteristics of noise source).
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Moderate (Population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors).
Mitigation measures	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land-owners. Moreover, blasting time-frames should be made available to locals well in advance so that livestock can be secured and people have 	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land-owners. Moreover, blasting time-frames should be made available to locals well in advance so that livestock can be secured and people have the chance to vacate the area.

	the chance to vacate the area. ✧ Construction camp workers should be instructed to limit recreation-related noise (music), particularly at night and over weekends.	
Level of significance after mitigation	Potentially low	Potentially low
EMP requirements	Specify attenuating measures in respect of construction related noise impacts.	N/A

Further specialist studies required? No, to be addressed in EMP.

Discussion

The chief noise related impacts are anticipated to be emanating from construction / construction camp activity. Moreover, the transmission lines may exude a buzzing/humming noise, which is only perceptible when in close to proximity to the lines. Studies have found a reliable correlation between a sound's intensity and the number of people who reported getting annoyed. Sounds below 50 decibels (such as the hum of a fridge or air-conditioner) appear to annoy few people, whereas more are bothered by sound over 70 decibels (e.g. a vacuum cleaner) or, worse still, a pneumatic drill (120 decibels+)³⁰. Moreover, habituation readily takes place once an intrusive stimulus loses its novelty value, thus no longer eliciting orientation responses (OR) and not inducing cardiovascular reactivity (heart rate and blood pressure changes) normally associated with such arousal³¹.

In view of the above, noise generated by construction and construction camp related activity is anticipated to have more annoying properties than the hum/buzz of transmission lines. This is the case because the qualities of the former can vary in terms of incidence, nature and intensity, thus having novel properties and the potential to elicit an orientation response facilitated by physiological arousal. Given the temporary nature of the noise intrusion, long-term cardio-vascular or gastrointestinal disorders are therefore not expected to result. Residential proximity is also considered a modulating factor and population densities are important from the perspective of significance and intensity.

³⁰ Source: Kimble, 1990.

³¹ Source: Brügge, 2001.

Section 14-41 (A-H).		
Theme	Intrusion impacts	
Nature of impact	3.5.7.4.2 Increase in dust pollution	
Legal requirements	Consider regulations on dust pollution	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Perhaps during maintenance & inspection.
Intensity	Low to Moderate(Residential proximity and population densities serve as modulating factors).	Low to negligible.
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Moderate (Residential proximity and population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors).
Mitigation measures	Spray roads within the area, access roads and areas where vegetation has been removed for construction purposes with water to suppress dust	Spray roads within the area, access roads and areas where vegetation has been removed for construction purposes with water to suppress dust
Level of significance after mitigation	Low	Low
EMP requirements	Specify mitigation measures regarding dust suppression in EMP.	Specify mitigation measures regarding dust suppression in EMP.
Further specialist studies required? No, to be addressed in EMP.		

Discussion

The chief dust generating impacts are expected to emanate from construction activity and to a very minimal extent during operation and maintenance / checking of the transmission line. Residential proximity and population densities are key modulating factors in respect of intensity.

Section 14-41 (A-H).		
Theme	3.5.7.5 Well-being	
Nature of impact	<i>Impacts in respect of sense of place, aesthetic quality and visual impacts</i>	
Legal requirements	Consider regulations on dust pollution	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Permanent
Intensity	Low	Moderate
Probability of occurrence	Low	Highly probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Low	High
Mitigation measures	Limit negative impacts of construction camp(s).	Design mitigation. Mitigation measures to be informed by visual impact specialist and property owners.
Level of significance after mitigation	Low	Moderate
EMP requirements	Mitigation measures	Mitigation measures

Further specialist studies required? Quantifying reduction in property values due to (cumulative) visual impacts emanating from transmission lines and the allied consideration of retrenchment of workers is required.

Discussion

In evaluating impacts relating to 'sense of place' and 'aesthetic value', it has to be considered that it is not the objects or places that matter, but the *meaning* they have for the person interacting with his/her environment. How people perceive their world and the distinctions they draw (their mental 'maps' and narrative used to describe them) are influenced not only by mindset, preferences, attributed emotions and history, but is also subject to cultural influences and collective meaning. Within the context of the latter, it is probably fair to state that transmission lines and power pylons are generally not aesthetically pleasing and would influence the sense of place. This is particularly the case, given the proliferation of such infrastructure and the concomitant probability of cumulative impacts. The presence of three transmission lines in one area in particular would make it more difficult *not* to notice them, when visually scanning the area or when mentally articulating ones 'sense of the place' and describing it to others.

In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that, "our concerns are...specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations³². (See specialist study).

The Amakhosi consulted in this section of the study area (both north and south), have not raised concerns regarding sense of place, aesthetic quality or visual impact thus potentially warranting a low intensity rating. The Moderate intensity rating, however, serves to account for visual impact concerns raised by the Monuments Council.

³² Mark Wood Consultants (1991).

Section 14-41 (A-H). Specific impact focal points: C33 (north)(place of worship); F31(south)(Church); B22/23 (north)(graves); F 28(south)(graves).		
Theme	3.5.7.6 Sites of religious, cultural, historical or archaeological significance	
Nature of impact	<i>Destruction of sites of religious, cultural, historical or archaeological significance</i>	
Legal requirements	Archaeological sites are protected by the National Heritage Resources Act 25 of 1999. It is an offence to destroy, damage, excavate, alter or remove from its original position, or collect and archaeological material without a permit issued by the South African Heritage Resource Agency. Note must also be taken of the National Heritage Council Act, 11 of 1999.	
Stage	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Long-term
Intensity	Potentially high	Potentially high
Probability of occurrence	Probable	Probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes (proliferation of pylons and transmission lines in a historically significant area).
Level of significance	High	High
Mitigation measures	A full list of sites and routes of archaeological, cultural, religious, and historical significance must exist prior to the final route determination and construction. A specific set of mitigation measures as well as permits and negotiated agreements must be in place.	As during construction.
Level of significance after mitigation	To be determined by specialists after completion of the study and to be informed by negotiations and	High (due to cumulative impacts).

	permit provisions. (See also discussion below).	
EMP requirements	Include provisions of relevant Acts; construction mitigation; consultation (incl. affected parties and KZN Monuments Council) prior to construction.	Yes, provisions of relevant Acts; construction mitigation; consultation prior to construction.
Further specialist studies required? Yes.		
<p><u>Discussion</u></p> <p>❖ Places of worship</p> <p>A place of worship (a circle comprising of whitewashed stones) has been identified on the northern side of the study area (grid locality: C33). Should a northern route be pursued, it would be important not to disturb this place during construction and operation. It would furthermore be advisable for the contractor to enter into consultations with those using the circle in the case of relocation of this place and/or mitigation of any impacts. This provision should be written into the EMP and form part of contractual obligations.</p> <p>In the case of the Church (F31), factors such as access by the current congregation and its other social functions to the target community must be kept in mind when finalising the route alignment or in the case of relocation. Any construction related activity should similarly be planned to minimize any adverse impacts.</p> <p>❖ Graves</p> <p>A number of graves were identified in the northern (B22/23) and southern (F28) sections of the study area. The Amakhosi consulted have indicated that graves have significant value in the lives of the community. The Amakhosi are prepared to point out graves once a more definitive alignment has been decided upon. In the meantime, they would start identifying areas containing graves that would coincide with the proposed transmission line as indicated on the map.</p> <p>❖ Places of historical significance</p> <p>In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift, the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations³³”.</p>		

³³ Mark Wood Consultants (1991).

3.6 Section 42 – 56 (A-E)

3.6.1 General description of the area

From Nondweni, the proposed Transmission line would extend through a small section of commercially cultivated farmland and degraded areas, and through grasslands in an easterly direction to Umfolozi along the alignment of the existing Athene-Pegasus Power line. From an area near Simonskamp (D42) and Klipgat (E42), two alternative alignments have been proposed. One route would extend from the existing Athene-Pegasus Power line in a northerly direction to link up with the existing Pegasus-Umfolozi power line, where it would follow this alignment, cross the R34 (E50), up to Umfolozi. The other proposed route would continue along the alignment of the existing Athene-Pegasus line, but divert to the south of the line (E44) where it would continue to the south of the said line until it reaches Umfolozi.

3.6.2 Demographic characteristics

This section of the study area falls within the jurisdiction of the Ulundi Municipality. It is not a highly populated area. Two communities are present at the sections where the proposed line meets the existing Pegasus-Umfolozi Power line (A43) and the Athene-Pegasus Power line (C44) and where bend points are proposed. Farm workers, subsistence farmers and large-scale landowners also inhabit the area.

3.6.3 Land-use profile and socio-economic characteristics

Stock farming in the area is being augmented by game farming and eco-tourism, which has pulled the issue of negative visual impacts of transmission (and concomitant implications for tourism and future land development), into sharp focus. Subsistence farmers (C49), having secured government grants to acquire properties appear to be struggling and lack even basic amenities.

It can be gathered that this is a very scarcely populated area, with the exception of the more prominent communities concentrated in specific sections of the study area (A43 and D44). As is the case with rural areas such as these, it is expected that there are migrant workers seeking employment in the Ulundi area. One can therefore conclude that there is a great need for employment for the residents (although not many) in the study area. It also seems as if the residents do not have access to satisfactory social facilities.

3.6.4 Infrastructure *en-route*

Both the alternatives would cross the R34 at different points near the line's destination at Umfolozi, although some of the other roads would be crossed at various points (e.g. A43,

A44, A47, B49, C44, C45, C53). A railway line is also present to the north of the alternative transmission line (along existing Pegasus-Umfolozi line).

3.6.5 Issues/impacts

Main issues of concerns and anticipated impacts include:

- ✧ Inflow and outflow of temporary workers.
- ✧ Relocation of individuals and families and related social impacts.
- ✧ Socio-economic impacts
- ✧ Disruption of farming activity (including impact on unintended livestock movement).
- ✧ Management of access routes, fences and gates.
- ✧ Loss of residential/agricultural land (decrease of property values).
- ✧ Social problems due to construction camps and construction worker activities.
- ✧ Disruption of infrastructure and services.
- ✧ Health, safety and security risks e.g. fire risks, worker and community safety and spread of diseases such as HIV/AIDS.
- ✧ Tourism impacts.
- ✧ Intrusion impacts
- ✧ Impact on sense of place and aesthetic quality.
- ✧ Impact on sites of religious, cultural, historical or archaeological significance (a Heritage Site falls within this section).

3.6.6 Social Impact Assessment

The social impact assessment relating to this section is reflected in the tables below.

Table 3-3: Social Impact Assessment Tables: Section 42-56 (A-E)

Section 42-56 (A-E).		
Theme	3.6.6.1 Population Impacts	
Nature of impact	3.6.6.1.1 Inflow and outflow of temporary workers	
Legal requirements	None	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction / decommissioning	Intermittent (maintenance)
Intensity	Moderate	Moderate
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Not applicable	Negligible
Level of significance	Moderate to low	Low
Mitigation measures	<p>✧ The conduct of contract workers would have to be specified in construction camp management plans, including use and management of sanitation, water and waste as well as informal trading, running shebeens and interfering in local community/cultural affairs. A peer-group based incentive/fine scheme has been implemented successfully in other projects to help ensure compliance. Before commencement of construction, a bonus (e.g. R 30 000) is allocated to the workers and a fine system instituted. Compliance/transgressions are monitored by the Environmental Officer, the local community/property owners and fellow</p>	Not applicable.

	<p>workers. Every transgression carries a fine (e.g. R 30.00 for littering; R 120.00 for lighting a fire at a spot not demarcated for this purpose). These fines are subtracted from the bonus and the balance is split between workers at the end of the construction period. All transgressions are displayed in the site-office together with the name of the 'offender'. The idea of this system is to promote peer-group monitoring and penalising. This is usually effective, as all would benefit from keeping the bonus at the maximum.</p> <p>✧ Appointment of an independent person to monitor construction of the line, in consultation with potentially affected property owners.</p>	
Level of significance after mitigation	Potentially low	Low
EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)
<p><u>Discussion</u></p> <p>Given the specialist nature of transmission line construction, outside specialist contractor teams³⁴ will be deployed. The nature, extent and impact of this variable will depend on possible disruptions/intrusion/environmental impacts due to the presence of contractors (whether local or not) as well as potential clashes due to differences in racial and ethnic composition between locals and outside contractors.</p> <p>The presence of contractors and construction camps <i>per sé</i> is associated with a number of social and environmental problems, particularly in the wake of poor construction camp management practices. Such problems can include the erection of informal dwellings and allied problems such as lack of water, sanitation and waste disposal infrastructure, with concomitant health, environmental pollution and aesthetic impacts.</p>		

³⁴ Refer to section on employment equity, job creation and training.

In the rainy season, surface water run-off can result in faeces being washed into streams, posing health risks elsewhere. (The recent cholera epidemic in the Province is still fresh in everyone's mind). These problems can be exacerbated in the event of an in-migration of job-seekers from elsewhere, who may set-up informal dwellings in the vicinity of the construction camps. The probability of this occurring is, however, slight, given the limited potential for employment. Moreover, it is common practice for local informal vendors (notably women providing cooked food) to enter the area, given the new business opportunity provided by the construction workers.

Local property owners³⁵ have indicated that they had serious problems with the previous Eskom contractors who built the existing southern transmission line. The contractors apparently left behind waste materials and mixed concrete and their trucks and tractors damaged roads. The contractors also chopped down some of the indigenous species like the Cabbage and Kiepersol trees.

³⁵ Record of discussion held with property owners/questionnaires (White Umfolozi; Nhlazatshe).

Section 42-56 (A-E). Specific impact focal points: B43 (north)(dwellings); D44 (south)(dwellings); C48/49 (north)(dwellings/subsistence farming). D/E50,51 (south)(Farm Bloemhof/farmworker dwellings).		
Theme	Population Impacts	
Nature of impact	3.6.6.1.2 Relocation of Individuals and Families³⁶	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines.	
Stage	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Permanent (spatial); Psycho-social (see discussion below).	See discussion below.
Intensity	Moderate, to low (north and south). Alternative 1 (south): None anticipated.	Moderate, to low (north and south). Alternative 1 (south): None anticipated.
Probability of occurrence	Highly probable (northern alignment).	Highly probable (northern alignment).
Status of the impact	Negative	Negative
Cumulative Impact	Possible (southern alignment: farm workers).	Possible (southern alignment: farm workers).
Level of significance	High	High
Mitigation measures	<ul style="list-style-type: none"> ✧ Align route in a manner so as to limit the extent of relocation. ✧ Compensation for re-settlement and loss of dwelling and/or land. 	As during construction/decommissioning.

³⁶ Rating informed by anticipated extent of relocation, should the proposed transmission line follow a route closely aligned with the existing Athene-Pegasus and Pegasus-Umfolozi transmission lines. Dwellings on northern alignment digitally captured.

Level of significance after mitigation	Potentially Moderate	Potentially Moderate
EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)

Discussion

✧ Beneficiaries of government grant

The existing northern alignment traverses the properties of farmers who were beneficiaries of R15 000 government grants to buy the property on which they have lived for many years. Two families live on the northern side of the existing northern alignment and one family lives on the Southern side of this existing line. The three families comprise of 19, 20 and 18 members, respectively. The farmers indicated that, whilst they do not have problems with relocating from one point to the other within their farm, they are concerned about the costs of such relocation and rebuilding their property. The farmers indicated that they do not have relatives in other areas (i.e. away from the present land holdings). The farmers are unemployed and make a living through subsistence farming activities. The families do not have water and electricity and depend on the neighbouring farms for water.

It would be important for Eskom to be mindful of factors such as the current economic base of the property owner, access to transport, schools and other social services. It is important to consider that any change requires adaptive capacity by those who face relocation. (Relocation is recognised as a source of stress on life events scales). The ability to adapt to change is dependent on the psychological make-up of the individual; the nature and extent of the change as well as the degree to which social support is available within the family and community as well as a break with current social networks. The factors must be understood within the context or more tangible considerations such as ability to make a living in the newly allocated area, or being able to access current places of work without incurring major transport expenses or having to travel greater distances.

✧ Farmworkers: Bloemhof

Since the farm workers of the farm Bloemhof have been moved due to the previous project, problems could result if they had to be relocated again.

Section 42-56 (A-E). Specific impact focal points: C48/49 north)(dwellings/subsistence farming).		
Theme	Population Impacts	
Nature of impact	3.6.6.1.3 Disruption of social networks and daily movement patterns	
Legal requirements	None.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Low (Motivation: Low population density).	Low (Motivation: Relatively low frequency and extent of maintenance and inspection activity if compared to construction phase).
Probability of occurrence	Highly probable	Probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable (Motivation: Higher rate of maintenance and inspection activity due to the present of three transmission lines in the study area:- Athene-Pegasus; Pegasus-Umfolozi(1) and Pegasus-Umfolozi(2))
Level of significance	Moderate (low density population)	Low
Mitigation measures	<p>✧ <u>Disruption of existing social networks:</u> Mitigation of this impact is not readily achievable, as the contractor cannot readily be held accountable for worker conduct outside of working hours. It would, nevertheless be prudent for the contractor to encourage sensible conduct among workers, particularly as alcohol use, interference in local networks and unsustainable relationships are</p>	

	<p>concerned.</p> <ul style="list-style-type: none"> ✧ <u>Disruption of daily movement patterns:</u> (See EMP requirements below). 	
Level of significance after mitigation	Low	Low
EMP requirements	<p>Stipulate measures such as:</p> <ul style="list-style-type: none"> ✧ Strict adherence to speed limits when using local roads. ✧ Disciplinary action for reckless and drunk driving. ✧ Registration of a road servitude to access construction terrain. ✧ Strict enforcement of policies regarding the use of construction vehicles for private use over weekends (e.g. to visit shebeens; to transport locals, etc.). <p>There is little doubt that a monitoring function would have to be performed in respect of the above. This role could be fulfilled by the Environmental Officer, although community involvement in monitoring is desirable.</p>	As during construction.
Further specialist studies required? No.		

Discussion

Disruption of existing social networks: In view of being separated from their families, it is common for construction workers to engage with local communities. Short-term, unsustainable relationships with local women can result, with social consequences (e.g. unwanted pregnancies) manifesting long after construction workers have left the area. Unbecoming and unruly conduct of workers seeking recreational opportunities in local communities is another potential source of social conflict with the potential to disrupt social networks. A 'low' rating is, however, warranted, given the very low population densities in this section of the study area.

Disruption of daily movement patterns: Construction related vehicular movement has the potential to disrupt the daily movement patterns, although the low population density in itself is likely to minimise this impact. The point of access to the construction terrain from main access road(s) is a potential impact focal point.

Section 42-56 (A-E).		
Theme	3.6.6.2 Socio-economic impacts	
Nature of impact	3.6.6.2.1 Employment equity, job creation and training	
Legal requirements	The following Acts should be considered: Basic Conditions of Employment Act 75 of 1997; Skills Development Act 97 of 1998; Labour Relations Act 66 of 1995; Employment Equity Act 55 of 1998; and Government's Preferential Procurements Act of 1999.	
Stage	Construction and Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate, to low (negative): Lack of employment equity. Low (positive): job creation.	Moderate(negative): Lack of employment equity. Job creation: Little or no positive impact.
Probability of occurrence	Probable (negative & positive impacts)	Probable (negative and positive impacts).i
Status of the impact	Ranging from Negative to Positive	Ranging from Negative to Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	High	High
Optimisation measures (job creation).	The key optimisation measure is to ensure that locals (individuals; SMMEs) with the relevant skills/expertise are employed for construction. This would necessitate the creation of a labour desk as well as a skills audit to identify skills levels and determine training requirements. Multi-skills training would be sensible to ensure that skills are transferable and employment sustainable. It may be prudent to put in place standardised	Same optimisation measure as during construction and decommissioning apply, with the exception that the focus is operation and maintenance.

	<p>communication and dispute resolution procedures in respect of employment creation and training.</p> <p>The above would have to be standardised in the form of a contract provision, specifying input (training and job-creation plans) and output key performance indicators (actual evidence that local contractors and labour is being used).</p>	
Level of significance after mitigation	Moderate, to low (job creation). Lack of equity relating to the specialised component of the maintenance process cannot be mitigated.	High (lack of equity relating to the specialised component of the maintenance process cannot be mitigated). Job creation marginal to non-existent during operational phases. Mitigation thus of limited consequence.
EMP requirements	Contract compliance with EMP and monitoring of compliance.	...(as per construction & decommissioning)

Discussion

Employment equity refers to the extent to which the local skills match the requirements of the project proponent during construction, operation and decommissioning or, put differently, a lack of employment equity refers to a mismatch between local skills and the requirements of the proponent. This variable ranges from negative to positive. The *negative rating* serves to account for the specialised components of transmission line construction, which locals would not be able to undertake, despite training. This (main) component of the work is exclusively the domain of specialists. The *positive rating* serves to account for the job creation and training, which can readily be allocated to contractors/ SMMEs by the main contractor. The mitigation measures discussed above serve to ‘unlock’ the positive impacts.

An allied consideration in terms of this impact variable is that of potential conflict between locals as well as locals and outsiders. In this regard, it is important to consider that jobs are a scarce commodity. Introducing such a commodity into a resource-starved environment by itself has the potential to create competition as people attempt to secure this scarce commodity, hence the need for dispute resolution.

Job creation is a pressing need for the inhabitants of subsistence farms in this section of the study area.

Section 42-56 (A-E).		
Theme	Socio-economic impacts	
Nature of impact	3.6.6.2.2 Improved national, regional and local economy	
Legal requirements	None. (Provisions of the Development Facilitation Act to be considered).	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Low (positive)(local).	High (positive)(regional/national).
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Positive	Positive
Cumulative Impact	Not applicable	Not applicable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ Consider the socio-economic strategies of the Integrated Development Plans for the Ulundi area with a view to maximising local economic spin-offs. ✧ Promote use by contractors of local service industries (e.g. accommodation) and visitation of tourism attractions. ✧ Promote procurement of local building materials and services (backward linkages) for use during construction. 	Maximise use of local raw materials, goods and services through deliberate local affirmative procurement policies and strategies.

Level of significance after mitigation	High	High
EMP requirements	Not applicable.	Not applicable.
Further specialist studies required? Yes, quantification of economic spin-offs at the local, regional and national level.		
<p><u>Discussion</u></p> <p>It is evident that there will be <i>limited</i> direct benefit to local communities as a result of the new transmission line. Both the inflow of contractors as well the increased income level of locals who would secure employment during construction and operation is anticipated to have local economic spin-offs. It must, however, be noted that any new transmission line does not infer a tariff increase to local electricity supply. These tariffs are set independently by the local distribution authority (e.g. Municipality).</p> <p>The new transmission line is also anticipated to have a favourable economic impact at regional and national level, given that it would meet demand for additional electricity in the Richards Bay area. This area and its surrounds continue to show significant growth as an industrial centre in South Africa, and recently proposed developments are anticipated to result in a greater demand being placed on the electricity grid.</p> <p>It is important that Eskom considers in its planning the Integrated Development Plan for the uMzinyathi District, the Nqutu Council and the Endumeni (Dundee) Council. The Endumeni Council has appointed the Bergmaningerop/ Setplan/ Dludla Development Consortium to prepare an Integrated Development Plan (IDP) for the District as well as Endumeni. The firm Scott-Wilson, in turn, is responsible for the Nqutu IDP.</p>		

Section 42-56 (A-E). Specific impact focal points: C50 (north)(dwellings/subsistence farming). D/E50,51(south)(Farm Bloemhof); F52/53 (Farm Platberg); D46 (Farm Goudrif).		
Theme	Infrastructure/Socio-economic impacts	
Nature of impact	3.6.6.2.3 Disruption of farming activities	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Potentially permanent
Intensity	Moderate	Moderate
Probability of occurrence	Highly Probable	Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Close coordination with affected property owners / farmers is required to glean more information on farming-related activities and time-frames (planting; harvesting). Where possible, constructing activity and roll-out of the program should be responsive to the imperatives of the farmers.</p> <p>It would also be prudent to involve farmers/property owners and their representative organisations (e.g. Farmers'/Agricultural Unions) in discussions regarding construction activity, mitigation measures (including route alignment) as well as procedures in</p>	As during construction, with the addition that land-owners and the relevant authorities would have to be informed of maintenance activities in advance.

	<p>the case of compensation for maintenance and stock losses.</p> <p>The above should be included in the contractual provisions set by Eskom for the contractor.</p>	
Level of significance after mitigation	Moderate, to low	Moderate, to low
EMP requirements	<p>Stipulate mitigation measures such as:</p> <ul style="list-style-type: none"> ✧ Which existing roads can be used; ✧ Due process to be followed if additional access is required; ✧ Due process to be followed if life-stock is to be moved away from the construction terrain; ✧ Speed limits on local roads; ✧ Conduct by workers on-site (including closing of gates). ✧ Rehabilitation after completion of the construction process. 	As during construction.

Further specialist studies required? No.

Discussion

In cultivated areas, construction and operation and to a lesser extent, decommissioning activities could exert a negative impact on farming activity (e.g. harvesting and irrigation; movement/access of tractors/trucks) and result in crop destruction. Clearance of land to facilitate construction and increased use of local roads (maintenance) and/or the creation of additional access roads (erosion risk), as well as livestock loss due to gates being left open by workers, could have financial implications for farmers. Similar impacts could result from maintenance activity during operation, when workers would have to access properties. An allied consideration is the potential restriction on growth and harvesting of crops in the servitude. Moreover, harvesting methods could be adversely affected due to mechanised harvesting equipment not being able to negotiate the pylons.

Section 42-56 (A-E). Specific impact focal points: C49 (north)(dwellings/subsistence farming). D/E50,51 (south)(Farm Bloemhof); F52/53 (Farm Platberg). D46 (Farm Goudrif). C/D48/49 (middle/south)(planned game-lodge).		
Theme	Socio-economic impacts	
Nature of impact	3.6.6.2.4 Loss of land or land-use	
Legal requirements	Consider the Constitution, Section 24(1), and Expropriation guidelines	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Potentially permanent
Intensity	Potentially high	Potentially high
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly Probable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation, expropriation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on residential and agricultural land. ✧ Route planning to be mindful of the objective to minimise economic losses. 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding compensation, expropriation and mitigation. ✧ Selection of pylons and construction approaches with the least possible impact on residential and agricultural land. ✧ Route planning to be mindful of the objective to minimise economic losses.
Level of significance after mitigation	Moderate	Moderate
EMP requirements	✧ Formal land negotiation process with directly affected property/land owners;	Draft provisions to minimise impacts on tourism activity.

	<ul style="list-style-type: none"> ✧ Limit construction, decommissioning and operation/maintenance 'intrusions'. ✧ Limit impact through route alignment adjustments (where feasible and practicable). 	
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Further specialist studies required? Yes Quantification of potential current and future losses (notably due to visual impacts) to be done on a property-specific basis once final route alignment has been determined.

Discussion

Agricultural and allied land loss

In this section, there are pockets of cultivated land, which the proposed transmission line traverses. Whilst land-owners may not erect or build infrastructure under the lines, most farming activity may continue. A corridor of approximately **50m wide** is required for the servitude of a 400 kV transmission line. The degree of loss of land is subject to the type of pylon to be used and the nature and extent of construction activity. Harvesting may also be disrupted due to the shape and footprint of the power pylon and construction activity

A further consideration is the destruction of trees (e.g. Red ivory tree; cabbage tree; tree ferns, aloe and cycad) to make way for the transmission line.

Reduction in property values / 'Future Forgone' (notably in case of southern route alignment)

The high probability of cumulative impacts (three pylons would traverse the study area) raises the issues of property value reduction and places potential constraints on future development potential (Jordaan 656 portion 2,3,4; Platberg) notably within the game farming, hunting and general eco-tourism domains. Cumulative visual impacts and negative environmental impacts are perceived to be the main root cause in this regard. These impacts are anticipated to be more marked in the case of the southern alignment (notably the farms Bloemhof, Platberg, Jordaan (Leopard Rock being a Natural Heritage site) and Langgewacht (at Umfolozi sub-station).

Residential and allied land loss

The proposed transmission line passes close to and across dwellings (see 'specific impact focal points' at top of table). Due to the footprint of the proposed transmission line, relocation/servitude use and compensation (e.g. Langgewacht, at Umfolozi sub-station) is highly probable.

Section 42-56 (A-E).		
Theme	Socio-economic	
Nature of impact	3.6.6.2.5 Potential disruption of infrastructure and services	
Legal requirements	None.	
Stage	Construction/Temporary	Operation
Extent of impact	Local	N/A
Duration of impact	Construction	N/A
Intensity	Low to potentially high	N/A
Probability of occurrence	Probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	Moderate	N/A
Mitigation measures	<ul style="list-style-type: none"> ✧ Consultations are to be held prior to construction with individual property owners whose infrastructure may be affected. Detail maps are required which contain details on surface and sub-surface infrastructure. Construction would have to be planned in a manner to ensure minimal disruption of such infrastructure. In cases where such disruption is inevitable, negotiations would have to be held with affected parties at the outset to discuss compensation or restoration. ✧ Local property owners have suggested that fences should be cut open when construction 	N/A

	<p>starts. After completion of construction, the fences should then be restored to their original condition.</p> <p>✧ Rehabilitation after completion of the construction process.</p>	
Level of significance after mitigation	Potentially low	N/A
EMP requirements	Very specific details are to be included on the geographic locality of infrastructure and how this is to be dealt with from a construction perspective.	
Further specialist studies required? No, consultations and negotiations to be held with affected parties once candidate route has been determined.		
<p><u>Discussion</u></p> <p>The probability exists that telecommunications infrastructure, irrigation systems, sub-surface pipelines, and roads could be damaged through construction activity. The resultant disruption in essential services (e.g. water / sanitation / electricity supply) or restricted road use could range in intensity from having mere 'nuisance value' to being more severe. This would typically be the case if commercial enterprises, services to local hospitals, and access to towns and villages were disrupted for extended periods.</p> <p>However, mitigation is readily achievable, thus justifying a post-mitigation 'low significance' rating.</p>		

Section 42-56 (A-E).		
Theme	Socio-economic impacts	
Nature of impact	3.6.6.2.6 Tourism related Impacts	
Legal requirements	None.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local, regional, national
Duration of impact	For the duration of construction/temporary	Potentially permanent
Intensity	Moderate	Potentially high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<p>Wherever practicable and feasible, construction vehicles should avoid main tourist routes. If possible, the contractor could be obliged (EMP) to liaise with local tourism authorities to ascertain when large tourism tours and events are undertaken. In so doing, construction time-frames and phasing of the roll-out of the construction process could be set in a manner so as <i>not</i> to coincide / interfere with tours/events.</p> <p>It is important for the decisions regarding the location of construction camps to be informed by tourism related imperatives.</p>	<p>To be determined after further investigation, notably of the potential for cumulative impacts. Operation and maintenance time-frames could be determined in a similar manner as discussed under “construction” (◀).</p>

Level of significance after mitigation	Low	Moderate(Motivation: Cumulative impacts remain a concern, even if obvious visual mitigation techniques have been applied).
EMP requirements	Draft provisions to minimise impacts on tourism activity.	Draft provisions to minimise impacts on tourism activity.
Further specialist studies required? Yes: to investigate tourism-site specific impacts due to the transmission line and pylons as well as <i>en-route</i> impacts deriving from the presence of the proposed transmission line, including cumulative impacts. The visual impacts are already being investigated as part of the EIA.		

Discussion

Tourism presently contributes 10% to the Gross Geographic Product of the Province and is contributing significantly to the economy of the uMzinyathi District and particularly Dundee (Endumeni). A regional Tourism initiative focusing on the “Battlefields” of the area attracts ±39 000 visitors who pass through the area per year³⁷. Already in 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift, the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations³⁸”.

Whilst both construction and operation related activity could have an adverse effect on Tourism, it is the pylons themselves with their adverse aesthetic impact that are anticipated to have the most marked impact, potentially rendering the area less attractive. These impacts have the potential to be tourism-site specific (see specific impact focal points above), but would also manifest *en-route* to such sites. There is a high probability of cumulative impacts during operation (three transmission lines would traverse the study area), creating a more distinguishable ‘footprint’. Local tourism operators (e.g. Farm Jordaan; Bloemhof; Platberg), have expressed concerns about focal cumulative impacts, citing negative visual impact due to proliferation of power lines and pylons as chief impact sources.

It would be prudent for Eskom to enter into dialogue with the various local and provincial tourism authorities and operators to address concerns about cumulative impacts and further explore mitigation measures (EMP

³⁷ Source: Bergmaningerop/ Setplan/ Dlundla Development Consortium (2001).

³⁸ Mark Wood Consultants (1991).

Section 42-56 (A-E). Specific impact focal points: D53,54 (north)(dwellings/subsistence farming). D/E50,51 (south)(Farm Bloemhof/farmworker dwelling); F52/53 (Farm Platberg) (south) (farm; Game Lodge).		
Theme	Socio-economic: Farming and agriculture	
Nature of impact	3.6.6.2.7 Management of access routes, fences and gates	
Legal requirements	None	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local, regional
Duration of impact	Temporary	Long-term
Intensity	Moderate	Moderate(due to potential for cumulative impacts).
Probability of occurrence	Highly Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Possible
Level of significance	Potentially high.	Potentially high.
Mitigation measures	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure (e.g. fences) or stock losses. ✧ Gates on properties are to be closed after workers have moved through them to prevent stock losses and unintended movement of cattle (specifics regarding access control to be finalised on an individual basis). ✧ Choice of access routes and construction approaches to be informed by the imperative to limit/prevent impacts. 	<ul style="list-style-type: none"> ✧ Negotiations by Eskom with individual property owners regarding maintenance of roads and compensation in case of damage to infrastructure of stock losses. ✧ Gates on properties are to be closed after workers have moved through them to prevent stock losses and unintended movement of cattle. ✧ Choice of access routes to be informed by the imperative to limit/prevent impacts.

Level of significance after mitigation	Moderate, to low	Moderate to low
EMP requirements	Approaches and mitigation measures to be made a contract provision, which the proponent/contractors has to comply with.	Draft provisions to minimise impacts on tourism activity.
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>The management of access routes, fences and gates is specifically important in the farming areas. Specifically construction (and later maintenance/checks) will require use of access routes. This would not only imply an increase in traffic, but also a more rapid deterioration of roads, particularly in areas where erosion³⁹ already is a marked problem. Moreover, if workers fail to close gates after moving through them, this would pose a risk in terms of stock losses, unintended integration of rams and ewes, or the ingress of animals from elsewhere.</p>		

³⁹ See specialist study on erosion.

Section 42-56 (A-E).		
Theme	3.6.6.3 Health, Safety and Security	
Nature of impact	3.6.6.3.1 Potential increases in fire hazards (management of the servitude area)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate, to high	Moderate, to high
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Probable
Level of significance	High.	High.
Mitigation measures	Adherence to Eskom's policies on labour camps and work fires should be make a contract provision. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to construction. Access roads could serve as firebreaks.	Sound design and servitude management practices to be applied to minimise impact. A fire/emergency management plan (including maps) is to be developed and tested in conjunction with local Municipalities prior to operation. Access roads could serve as firebreaks.
Level of significance after mitigation	Moderate	Moderate
EMP requirements	Include Eskom's policies on labour camps and worker fires as an aspect to be adhered to by the contractor and monitored by the Environmental Officer (EO).	-

Further specialist studies required? No.

Discussion

The practices of construction workers (cooking/heating; stray matches or cigarettes) create a potential for an increase in stray fires. Moreover, the transmission lines could pose a fire risk through sparking. (One property owner mentioned that a bird had caught fire on the power line, in turn, setting the underlying veld alight). This could exert negative impacts on cultivated land and in terms of the safety of people and animals and may pose a risk to infrastructure and houses. The type of vegetation is seen to be a modulating factor of in respect of the occurrence of this impact.

It is important for a fire/emergency management plan and associated communication channels to be in place, with local fire/emergency teams as key players. It would be important to rehearse such a plan and the functionality/efficacy of communication channels on a regular basis and in conjunction with local emergency/fire fighting teams, to ascertain reaction times and identify snags and weaknesses.

Section 42-56 (A-E).		
Theme	Health, Safety and Security	
Nature of impact	3.6.6.3.2 Perceived safety/security threat	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	Local and regional
Duration of impact	For the duration of construction/temporary	Permanent
Intensity	Moderate	Moderate
Probability of occurrence	Probable	Highly Probable.
Status of the impact	Negative	Negative
Cumulative Impact	No	Improbable
Level of significance	High.	High.
Mitigation measures	<ul style="list-style-type: none"> ✧ <u>In respect of construction worker safety</u> Put in place health & safety management plans. ✧ <u>In respect of community safety</u> It would be prudent for the main contractor to contact local community organisations to discuss issues of concern in respect of safety and security concerns relating to the presence of construction workers. This should be done before construction commences. Workers deployed in the area should be obligated to wear clothing or identity cards. This would help distinguish them as construction workers and differentiate them from opportunists who may enter the area posing as construction workers 	As during construction / decommissioning.

	and committing crimes. A further suggestion may be for the contractor to brief workers not to enter private properties, requesting water/food or to use ablution facilities.	
Level of significance after mitigation	Moderate, to low	Moderate, to low
EMP requirements	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.	Specify health and safety requirements for adherence by the contractor and monitoring by the Environmental Officer (EO). Specify conduct requirements of contract workers and the management of the construction camps in the EMP.

Further specialist studies required? No.

Discussion

Two safety consideration are of particular importance:

✧ **Construction worker safety**

There are a number of occupational safety risks associated with transmission line construction, including electrocution risks, risk of falling from working at heights and allied risks normally associated with construction (e.g. falling objects). Compliance with the health and safety legislation would be required.

✧ **Community safety**

Two potential impacts apply in this regard, namely:

- Electrocution risk (people and livestock), particularly because of structural failure of pylons and transmission lines or tampering.
- Safety and security threats posed by the presence of the construction camps/workers. Experience shows that locals readily (justly or unjustly) attribute increases in theft and other crimes to the presence of construction workers, particularly if these workers are from elsewhere. Theft of gates by construction team members has been mentioned by a property owner in this section of the study area.

Section 42-56 (A-E).		
Theme	Health, Safety and Security	
Nature of impact	3.6.6.3.3 Health impacts (HIV/AIDS)	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local, regional	N/A
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	N/A
Intensity	Moderate	N/A
Probability of occurrence	Probable	N/A
Status of the impact	Negative	N/A
Cumulative Impact	No	N/A
Level of significance	High	N/A
Mitigation measures	<ul style="list-style-type: none"> ✧ Oblige contractor to ensure that workers are educated on HIV/AIDS and that condoms are distributed within the construction camp. In this regard, the contractor could liase with the local health services to ensure that their education/condom distribution programmes extend to the construction camps. ✧ Careful consideration should be given to construction camp location vis a vis denser settlements. 	N/A
Level of significance after mitigation	Uncertain	N/A

EMP requirements	Health education/condom distribution could be written into EMP as a provision that the contractor needs to comply with.	N/A
Further specialist studies required? No.		
<p><u>Discussion</u></p> <p>An increase in sexually transmitted infections (STIs) and HIV/AIDS is increasingly being recognised as a tangible risk associated with construction camps. Workers are separated from their families, and it is not uncommon that construction camps are frequented by local sex workers. It must be recognised that this impact has two dimensions in that contractors can infect sex workers and <i>vice versa</i>. It is estimated that over one million adults are currently infected – this Province having the highest rates of HIV infection in the country⁴⁰.</p> <p>Commensurate with the very low population density in this section of the study area, a moderate rating as far as impact intensity is concerned, seems warranted.</p>		

⁴⁰ Source: Bergmaningerop/ Setplan/ Dlundla Development Consortium (2001).

Section 42-56 (A-E). Social impact focal points: D53,54 (north)(dwellings/subsistence farming). D/E50,51(south)(Farm Bloemhof/farmworker dwellings).		
Theme	Health, Safety and Security	
Nature of impact	3.6.6.3.4 Electromagnetic field (EMF) health risks	
Legal requirements	None.	
Stage	N/A	Operation
Extent of impact	N/A	Local
Duration of impact	N/A	Permanent
Intensity	N/A	Moderate (North); Low (Southern alignment: Alternative 1).
Probability of occurrence	N/A	Highly probable.
Status of the impact	N/A	Negative
Cumulative Impact	N/A	Uncertain
Level of significance	N/A	From a perceptual orientation, potentially high. Precautionary measures: highly significant (see below).
Mitigation measures	N/A	The following recommendations have been formulated by the WHO ⁴¹ : <ul style="list-style-type: none"> ✧ Strict adherence to existing national or international safety standards, based on current knowledge to protect everyone in the population with a large safety factor. ✧ Simple protective measures: creation of barriers und strong electromagnetic field sources to help preclude unauthorized access to areas where exposure limits may be exceeded.

⁴¹ WHO, 2001a.

		<ul style="list-style-type: none"> ✧ Consultation with local authorities and the public in siting new power lines. Siting decisions are required to take into account aesthetics and public sensitivities. ✧ Open communication during the planning stages to create public understanding and greater acceptance of a new transmission line or facility and to reduce any mistrust and fears.
Level of significance after mitigation	N/A	Potentially low.
EMP requirements	N/A	Include WHO precautionary recommendations.
<p>Further specialist studies required? Investigations of a technical nature by Eskom regarding EMFs seem warranted and could feed into the work of the WHO EMF agency.</p> <hr/> <p><u>Discussion</u></p> <p>Magnetic fields that naturally emanate from sources such as transmission lines are directly proportionate to the amount of current flowing on the transmission line at any given time. A higher loading condition such as may be present in hot weather summer months will result in increased magnetic field levels⁴².</p> <p>According to the World Health Organisation (WHO)⁴³, it has become increasingly unlikely (based on the existing body of research) that exposure to EMFs constitutes a serious health hazard, although some uncertainty remains. The WHO's statement derives from a study by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) (June 2001), which, using the standard IARC classification that weighs human, animal and laboratory evidence, classified ELF magnetic fields as <i>possibly carcinogenic to humans</i> based on epidemiological studies of childhood leukaemia.</p>		

⁴² Source: Munderloh, Hiles & Griffing (2001).

⁴³ WHO, (2001b).

Evidence for all other cancers in children and adults, as well as other types of exposures (i.e. static fields and ELF electric fields) was considered not classifiable either due to insufficient or inconsistent scientific information. "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. This is the weakest classification of three categories ("*is carcinogenic* to humans", "*probably carcinogenic* to humans" and "*possibly carcinogenic* to humans") used by IARC to classify potential carcinogens based on published scientific evidence. EMFs fall in this classification category together with Coffee, Styrene, Gasoline engine exhaust and Welding fumes. The WHO further notes that whilst research continues, an analysis of the balance between cost and potential hazards is essential.

One property owner believes that game could be negatively affected by transmission lines.

Section 42-56 (A-E).		
Theme	Health, Safety and Security	
Nature of impact	3.6.6.3.5 Use of creosote poles	
Legal requirements	The Occupational Health and Safety Act 85 of 1993 should be considered.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Temporary (long-term health impacts possible).	Very short-term, and subject to the need to restring lines during maintenance.
Intensity	Moderate	Low
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	Probable ⁴⁴ (from a health perspective if the same workers are repetitively exposed to creosote poles during multiple construction processes).	Unlikely (unless same maintenance workers have been in repetitive contact with creosote poles during multiple construction and maintenance processes).
Level of significance	Potentially high	Low
Mitigation measures	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation 	<ul style="list-style-type: none"> ✧ Handling procedures and areas of storage. ✧ Health and safety standards ✧ Pole specifications ✧ Ground remediation
Level of significance after mitigation	Potentially low.	Potentially low.

⁴⁴ Not within the context of this project, but across projects.

EMP requirements	Yes, handling procedures and areas of storage; health and safety standards; pole specifications and ground remediation methods should be presented in the EMP.	Yes, handling procedures, health and safety standards, pole specifications and ground remediation methods should be presented in the EMP.
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Further specialist studies required? No.

Discussion

IPCS Inchem (Canadian Centre for Occupational Health and Safety) cites a study on the development of skin cancer in workers exposed to creosote. This study involved a review of 3753 cases of cutaneous epithelioma from 1920 to 1945 and showed that 35 cases (12 of which were of the scrotum) had had exposure to creosote. Most cases occurred in workers handling creosotes or creosoted wood during timber treatment. A mortality analysis of workers in many occupations indicated an increased risk of scrotal cancer for creosote-exposed brick-makers. The overall evaluation states that: "creosotes are probably carcinogenic to humans". Creosotes and creosote oils were also tested for carcinogenicity in mice by skin application, producing skin tumours, including carcinomas. One of the creosotes also produced lung tumours in mice after skin application.

In respect of the proposed transmission line construction process it should be noted that, whilst construction workers will handle poles, only a limited number of poles will be erected. This will be limited to the stringing process where transmission lines span roads. These temporary structures will be dismantled within approximately two weeks thus limiting the potential for contamination. However, cumulative impacts are probable, with the construction activity of this proposed project playing a contributory role.

Section 42-56 (A-E). Specific impact focal points: D/E50,51 (south)(Farm Bloemhof/farmworker dwelling); F52/53 (Farm Platberg (south) (farm; Game Lodge).		
Theme	3.6.6.4 Intrusion impacts	
Nature of impact	3.6.6.4.1 Increase in noise pollution	
Legal requirements	Consider regulations on acceptable noise levels.	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Impact manifests for duration of construction – consequences potentially permanent.	Permanent
Intensity	Moderate, to low (Residential proximity and the properties of the noise sources serve as modulating factors).	Low
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Moderate, to low (Population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors. However, local property owners claim that the humming of the transmission line is more marked after rainfall).
Mitigation measures	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land- 	<ul style="list-style-type: none"> ✧ Limit intrusive construction activity to daylight hours. ✧ Ensure that all machinery is in good order as far as silencers are concerned and complies with generally accepted noise levels. ✧ Any high impact activity (such as using dynamite to blast rocks or carve servitudes through mountains) would require prior approval by land-owners. Moreover, blasting time-

	<p>owners. Moreover, blasting time-frames should be made available to locals well in advance so that livestock can be secured and people have the chance to vacate the area.</p> <p>✧ Construction camp workers should be instructed to limit recreation-related noise (music), particularly at night and over weekends.</p>	frames should be made available to locals well in advance so that livestock can be secured and people have the chance to vacate the area.
Level of significance after mitigation	Potentially low	-
EMP requirements	Specify attenuating measures in respect of construction related noise impacts.	N/A
Further specialist studies required? No, to be addressed in EMP.		

Discussion

The chief noise related impacts are anticipated to be emanating from construction / construction camp activity. Moreover, the transmission lines may exude a buzzing/humming noise, which is only perceptible when in close to proximity to the lines. However, local property owners claim that the noise from the existing lines is more intrusive after rainfall.

Studies have found a reliable correlation between a sound's intensity and the number of people who reported getting annoyed. Sounds below 50 decibels (such as the hum of a fridge or air-conditioner) appear to annoy few people, whereas more are bothered by sound over 70 decibels (e.g. a vacuum cleaner) or, worse still, a pneumatic drill (120 decibels+)⁴⁵. Moreover, habituation readily takes place once an intrusive stimulus loses its novelty value, thus no longer eliciting orientation responses (OR) and not inducing cardiovascular reactivity (heart rate and blood pressure changes) normally associated with such arousal⁴⁶.

In view of the above, noise generated by construction and construction camp related activity is anticipated to have more annoying properties than the hum/buzz of transmission lines. This is the case because the qualities of the former can vary in terms of incidence, nature and intensity, thus having novel properties and the potential to elicit an orientation response facilitated by physiological arousal. Given the temporary nature of the noise intrusion, long-term cardio-vascular or gastrointestinal disorders are therefore not expected to result. Residential proximity is also considered a modulating factor and population densities are important from the perspective of significance and intensity.

⁴⁵ Source: Kimble, 1990.

⁴⁶ Source: Brügge, 2001.

Section 42-56 (A-E).		
Theme	Intrusion impacts	
Nature of impact	3.6.6.4.2 Increase in dust pollution	
Legal requirements	Consider regulations on dust pollution	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Perhaps during maintenance & inspection.
Intensity	Low to moderate (Residential proximity and population densities serve as modulating factors).	Low to negligible.
Probability of occurrence	Highly probable	Improbable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes
Level of significance	Low (Residential proximity and population densities serve as modulating factors).	Low (Residential proximity and population densities serve as modulating factors).
Mitigation measures	Spray roads within the area, access roads and areas where vegetation has been removed for construction purposes with water to suppress dust	Spray roads within the area, access roads and areas where vegetation has been removed for construction purposes with water to suppress dust
Level of significance after mitigation	Low	Low
EMP requirements	Specify mitigation measures regarding dust suppression in EMP.	Specify mitigation measures regarding dust suppression in EMP.
Further specialist studies required? No, to be addressed in EMP.		

Discussion

The chief dust generating impacts are expected to emanate from construction activity and to a very minimal extent during operation and maintenance / checking of the transmission line. Residential proximity and population densities are key modulating factors in respect of intensity.

Section 42-56 (A-E). Specific impact focal points:		
Theme	3.6.6.5 Well-being	
Nature of impact	<i>Impacts in respect of sense of place, aesthetic quality and visual impacts</i>	
Legal requirements	Consider regulations on dust pollution	
Stage	Construction/Decommissioning	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Permanent
Intensity	Low	Moderate to high (south and Alt.1, south : focal). Low (at cross-over: aesthetic quality-related impacts no elicited during consultation).
Probability of occurrence	Low	Highly probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Highly probable
Level of significance	Low	High
Mitigation measures	<ul style="list-style-type: none"> ✧ Unobtrusive placement of construction camps ✧ Containment of construction-related activity 	<ul style="list-style-type: none"> ✧ Design mitigation ✧ As determined by visual impact specialist ✧ Develop mitigation measures in consultation with affected property owners
Level of significance after mitigation	Low	Moderate
EMP requirements	Inclusion of mitigation measures	

Further specialist studies required? Yes. Quantifying reduction in property values due to (cumulative) visual impacts emanating from transmission lines and the allied consideration of retrenchment of workers is required.

Discussion

In evaluating impacts relating to 'sense of place' and 'aesthetic value', it has to be considered that it is not the objects or places that matter, but the *meaning* they have for the person interacting with his/her environment. How people perceive their world and the distinctions they draw (their mental 'maps' and narrative used to describe them) are influenced not only by mindset, preferences, attributed emotions and history, but is also subject to cultural influences and collective meaning. Within the context of the latter, it is probably fair to state that transmission lines and power pylons are generally not aesthetically pleasing and would influence the sense of place. This is particularly the case, given the proliferation of such infrastructure and the concomitant probability of cumulative impacts. The presence of three transmission lines in one area in particular would make it more difficult *not* to notice them, when visually scanning the area or when mentally articulating ones 'sense of the place' and describing it to others.

Local property owners (southern sections) have expressed concern that the transmission lines would (notably in a cumulative sense), detract from the aesthetic qualities of the area, thus impacting negatively on eco-tourism and property values, inter alia.

In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that, "our concerns are...specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations"⁴⁷. (See specialist study).

⁴⁷ Mark Wood Consultants (1991).

Section 42-56 (A-E). Specific impact focal points: C47 (Portion 1: Farm Jordaan); B48 (Portion 2: Farm Jordaan) (Natural Heritage Site). C53,54 (north)(graves); E52 (south)(graves).		
Theme	3.6.6.6 Sites of religious, cultural, historical or archaeological significance	
Nature of impact	<i>Destruction of sites of religious, cultural, historical or archaeological significance</i>	
Legal requirements	Archaeological sites are protected by the National Heritage Resources Act 25 of 1999. It is an offence to destroy, damage, excavate, alter or remove from its original position, or collect and archaeological material without a permit issued by the South African Heritage Resource Agency. Note must also be taken of the National Heritage Council Act, 11 of 1999.	
Stage	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Construction	Long-term
Intensity	Potentially high.	Potentially high; Potential no-go area (heritage site).
Probability of occurrence	Possible	Probable
Status of the impact	Negative	Negative
Cumulative Impact	No	Yes (proliferation of pylons and transmission lines in a historically significant area).
Level of significance	High	High
Mitigation measures	A full list sites and routes of archaeological, cultural and historical significance must exist prior to final route determination and construction. A specific set of mitigation measures as well as permits and negotiated agreements must be in place.	As during construction.
Level of significance after mitigation	To be determined by specialists after study and to be informed by negotiations and permit provisions. (See also discussion below).	

EMP requirements	Include provisions of relevant Acts; Construction mitigation; potential relocation/compensation. Consultation prior to finalisation of route alignment and construction (affect parties; KZN Monuments Council).	Yes: Provisions of relevant Acts; Construction mitigation; potential relocation/compensation. Consultation prior to finalisation of route alignment and construction (affect parties; KZN Monuments Council).
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Further specialist studies required? Yes.

Discussion

Natural Heritage Site

Portions 1 & 2 of Farm Jordaan have been declared a Natural Heritage Site.

Graves

There are a number of graves on the northern side of the study area, where the relatives of subsistence farmers are buried as well as on the southern side (farm Platberg).

General considerations

In 1991, when the construction of the Eskom 400kV transmission line between the Pegasus sub-station and Richards Bay was on the cards, the KwaZulu Monuments Council raised concerns. They noted that: “the study area to a large extent...encompasses the route of the initial invasion of Zululand by the British Colonial Army in the Anglo-Zulu War of 1879. It contains the now internationally famous battlefields of Isandlwana and Rorke’s Drift, the location of the combat-death of Louis Bonaparte IV – Prince Imperial of France, and numerous forts and skirmish sites”. The Council further noted that, “our concerns are thus specifically the visual impact of the transmission lines on historical sites that currently enjoy a high tourist flow, and further, those in the process of being developed as tourist destinations⁴⁸”.

Note:

The above discussion is based on consultation with Interested and Affected Parties. Consequently, the sites of religious, cultural, historical or archaeological significance mentioned are not comprehensive and still subject to a specialist study. Rating is thus subject to change.

⁴⁸ Mark Wood Consultants (1991).

4. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary of impacts across the study area

The impacts set-out below are predominantly short-term in nature and associated with the *construction process*. These impacts, whilst significant, are more functional than spatial in nature⁴⁹, not unique to transmission lines per sé, and not central to the process of determining the route alignment.

- ✧ Inflow/outflow of temporary workers: The negative impacts are anticipated to prevail in Section 14-41, northern sector of the study area.
- ✧ Disruption of social networks and daily movement patterns: The negative impacts are expected to predominate in Section 14-41, northern sector of the study area.
- ✧ Safety & security impacts: The negative impacts are anticipated to be of moderate intensity in Section 3-13/42-56 and of moderate to high intensity in Section 14-41(north).
- ✧ Health impacts (HIV/AIDS; use of creosote poles: impacts predominate during construction): The negative impacts are anticipated to be of moderate intensity⁵⁰ in Section 3-13/42-56 and of high intensity (notably northern sector) in Section 14-41.
- ✧ Employment equity, job creation and training: Negative and positive impacts are anticipated. Impacts regarding lack of employment equity (negative) are rated moderate in intensity in respect of Section 3-13, high in respect of Section 14-41(north) and moderate (north) to low (south) in respect of Section 42-56.
- ✧ Intrusion impacts (noise): Negative impacts related to construction and construction camp activity are anticipated to be more marked than those exuded by the transmission line, once operational. Population densities and proximity to the noise source, as well as the characteristics of the latter (e.g. novel versus habitual; intensity) would modulate the impact intensity.
- ✧ Local, regional, national economic benefits: Positive impacts of a local nature (economic spin-offs commensurate with the construction process) are rated low in intensity (irrespective of route alignment). (Positive impacts of a regional/national nature are rated high, but would only come into play once the line is operational).

⁴⁹ There are few exceptions where construction activity plays a role in route alignment, such as in the case of disruption of farming activity. However, in these instances, operation related impacts usually co-exist with, and are similar in intensity to, operation/maintenance-related impacts.

⁵⁰ Creosote related impacts do not vary as a function of route alignment.

4.2 Conclusions and Recommendations

4.2.1 General conclusions and recommendations

The analysis shows that social impacts commensurate with the *construction* of the proposed transmission line are in most instances anticipated to be of a high or potentially high significance, with intensity ratings depending on the nature of the receiving social environment. In most instances, the impacts are expected to be responsive to mitigation measures, if instituted properly and preferably in a consultative fashion with affected parties. Impacts as well as mitigation measures should be subjected to a robust monitoring process, using a comprehensive Environmental Management Plan (EMP) as a basis.

As far as operation/maintenance is concerned, impacts of a high and potentially high intensity/significance exist that should inform the final route alignment and mitigation measures (see below). Depending on the final route alignment, the outcome of further consultation and negotiation with property owners/local leaders regarding servitudes, compensation and relocation, the results of specialist archaeological studies and considering potential high impact and no-go areas, the project does not appear to be fatally flawed from a social impact perspective. It is recommended that the final route alignment be informed by the analysis below, whilst taking all other studies and considerations into account.

4.2.2 Toward a route alignment

The analysis is based on a consideration of long-term, operation/maintenance related impacts, whilst excluding construction related impacts (see rationale above). From the analysis reflected in Table 4.1 below, it is evident that:

- ✧ In Section 3-13, a southern or northern alignment would be associated with similar social impacts, some of which (i.e. relocation; loss of land-use; disruption of farming activity) would only become fully evident once a final design has been decided upon.
- ✧ In Section 14-41, a northern alignment would appear to have marginally more marked impacts as far as important considerations such as relocation are concerned.
- ✧ In Section 42-56, a southern alignment would appear to be more suitable, up to the cross-over point. Both the remainder of Section 42-56 (south) (notably 47-55) as well as Alternative 1 (south of the southern line) would appear to be problematic from a sense of place, aesthetic quality, visual impact and focal eco-tourism impact point of view and may perhaps even be a no-go area (National Heritage Site: farm Jordaan). Moreover, a potential⁵¹ for current losses in land value, reduced future development potential (and concomitant impacts on jobs) due to the presence of another

transmission line, exists. This is the only section that is associated with expressed intent by a property owner to “defend his Constitutional Rights in the Highest Courts and the International Media”⁵², should the line cross the property.

- ✧ Beyond the cross-over point, a northern alignment would appear to be more suitable from a social impact perspective than a southern alignment. Moreover, with the exception of reservations about cumulative, perception-based visual impacts and concerns expressed by the KZN Monuments Council, it may be sensible to place the transmission line next to existing infrastructure (railway line, road, existing Pegasus-Umfolozi transmission line). This appears to be preferable to introducing a new line into a pristine area. However, three families (57 individuals) (subsistence farmers) would probably face relocation (focal point: C49, north). The families are willing to relocate but expect compensation if they have to build other houses elsewhere. Similarly, if relocation isn't necessary, they would expect compensation if the line traverses their property. In keeping with the notion of 'impact equity' (who wins and who loses), and when deciding on the final alignment, it would be important to balance the impacts faced by the emerging subsistence farmers with their limited resources against the large property owners, whilst bearing in mind the so-called 'NIMBY' (Not-in-my-backyard) syndrome. Such a process should be informed by a quantification of current and anticipated future losses, given that property owners perceive Eskom power lines as directly affecting the eco-tourism potential of the area.
- ✧ The cross-over point itself is a potential focal point for social impacts, as the table below suggests. It would be important to weigh-up these focal impacts against the benefits and disbenefits commensurate with the continuation of the line along a northern alignment.

4.2.3 Consultation, mitigation and monitoring

Based on the expressed wishes of both property owners and Amakhosi, it would appear imperative to put in place a monitoring mechanism during the construction process. Mitigation Monitoring Committees have been used with great success in other projects of a linear nature. Such a committee can be constituted during a public meeting, with membership changes as the construction process continues along the entire route. It is common for affect parties to participate in MMCs until such time that their concerns and needs have been addressed or the construction activity moves on to another area. New members tend to join the proceedings as the construction process starts to have a bearing on their specific property.

⁵¹ Quantification of current and future losses falls outside the scope of this assessment.

⁵² Public participation report, Procon.

Moreover, it would be important to precede the MMC process with more in-depth consultations and negotiations regarding detail design of the final route, compensation and relocation. Special mention has been made of the need to channel all communication through the Amakhosi in the tribal areas.

Table 4-1: Integrated analysis of social impacts with a bearing on route alignment

Impact Variable	Northern Line in sub-sections			Southern Line in sub-sections			Alternative 1 (South)	Cross-over
	3-13	14-41	42-56	3-13	14-41	42-56		
Relocation of individuals or families	Low	High	Low	Low	Moderate to high	Low	None expected.	Moderate to low
Disruption of farming activity	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high
Loss of agricultural land use	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high
Tourism related impacts	Potentially high, not necessarily focal.	Potentially high, not necessarily focal.	Potentially high, not necessarily focal.	Potentially high, not necessarily focal.	Potentially high, not necessarily focal.	Potentially high, not necessarily focal.	Potentially high, focal and non-focal	Potentially high, not necessarily focal
Management of access routes, fences, and gates	Moderate, but CI ⁵³ potential exists.	Moderate, but CI potential exists.	Moderate, but CI potential exists.	Moderate, but CI potential exists.	Moderate, but CI potential exists.	Moderate, but CI potential exists.	Moderate	Moderate, but CI potential exists.
Electro-magnetic field health risks (role of proximity to source)	Low	Moderate to high	Low	Low	Moderate to low	Moderate to low	Low	Moderate to low
Noise pollution (operation).	Low	Moderate to low	Low	Low	Low	Low	Low	Low
Sense of place; aesthetic quality; visual impacts and associated economic considerations.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate to high	Moderate to high	Low
Sites of cultural, religious, cultural, historical or archaeological significance	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high	Potentially high & 'no-go' (heritage site).	Potentially high & 'no-go' (heritage site).	Potentially high

⁵³ CI = Cumulative impacts.

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