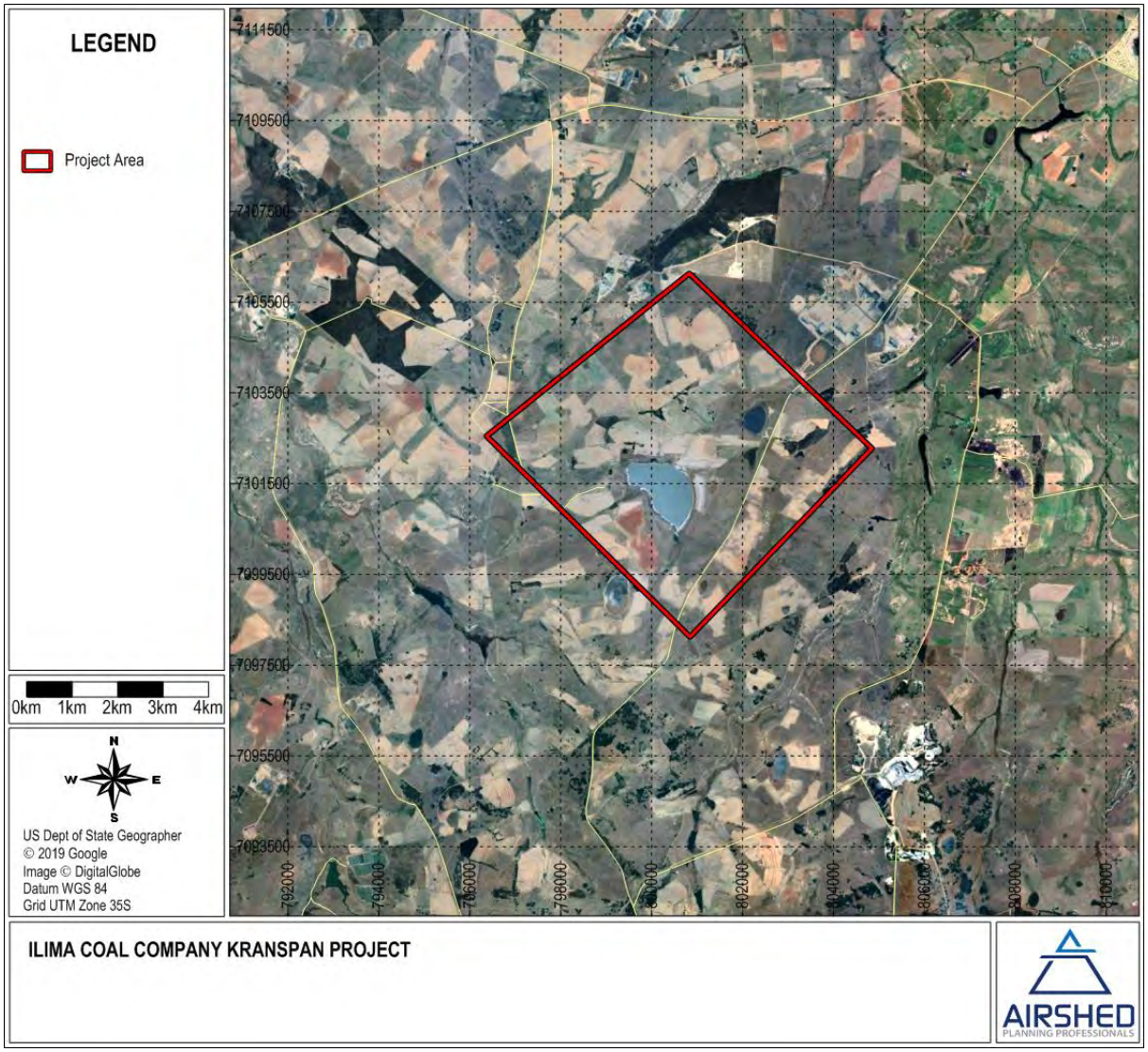


Figure 1: Location of Kranspan Project

1.3 Specialist Information

1.3.1 Specialist Details

Airshed is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of specialised services as stipulated in the terms of reference.

1.3.2 Competency Profile of Specialist

Andre Bruwer is currently appointed as a Junior Air Quality Consultant at Airshed Planning Professionals. He has a Master's degree in Environmental Engineering specialising in air quality. For the past 2 years he's been employed full time at Airshed Planning Professionals, but has also worked for them part time as Laboratory- and as a Field Technician for 5 years.

A comprehensive curriculum vitae of Andre Bruwer is provided in Appendix B.

1.4 Description of Activities from a Noise Perspective

Construction and operational phases activities will include bulk earthworks. Ore from the opencast mining section will be hauled to the processing plant with articulated dump trucks, while ore from the underground mining section will be moved on conveyors to the processing plant during the operation phase. During decommissioning, bulk earthworks and demolishing activities are expected.

Construction and diesel mining equipment can be described or divided into distinct categories. These are earthmoving equipment, materials handling equipment, stationary equipment, impact equipment, and other types of equipment. The first three categories include machines that are powered by internal combustion engines. Machines in the latter two categories are powered pneumatically, hydraulically, or electrically. Additionally, exhaust noise tends to account for most of the noise emitted by machines in the first three categories (those that use internal combustion engines) whereas engine-related noise is usually secondary to the noise produced by the impact between impact equipment and the material on which it acts (Bugliarello *et al*., 1976).

1.5 Background to Environmental Noise and the Assessment Thereof

Before more details regarding the approach and methodology adopted in the assessment is given, the reader is provided with some background, definitions and conventions used in the measurement, calculation and assessment of environmental noise.

Noise is generally defined as unwanted sound transmitted through a compressible medium such as air. Sound in turn, is defined as any pressure variation that the ear can detect. Human response to noise is complex and highly variable as it is subjective rather than objective.

A direct application of linear scales (in pascal (Pa)) to the measurement and calculation of sound pressure leads to large and unwieldy numbers. And, as the ear responds logarithmically rather than linearly to stimuli, it is more practical to express acoustic parameters as a logarithmic ratio of the measured value to a reference value. This logarithmic ratio is called a decibel or dB. The advantage of using dB can be clearly seen in Figure 2. Here, the linear scale with its large numbers is converted into a manageable scale from 0 dB at the threshold of hearing (20 micro-pascals (µPa)) to 130 dB at the threshold of pain (~100 Pa) (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

As explained, noise is reported in dB. "dB" is the descriptor that is used to indicate 10 times a logarithmic ratio of quantities that have the same units, in this case sound pressure. The relationship between sound pressure and sound pressure level is illustrated in this equation.

$$L_p = 20 \cdot \log_{10}\left(\frac{p}{p_{ref}}\right)$$

Where:

L_p is the sound pressure level in dB;
p is the actual sound pressure in Pa; and
p_{ref} is the reference sound pressure (p_{ref} in air is 20 µPa).

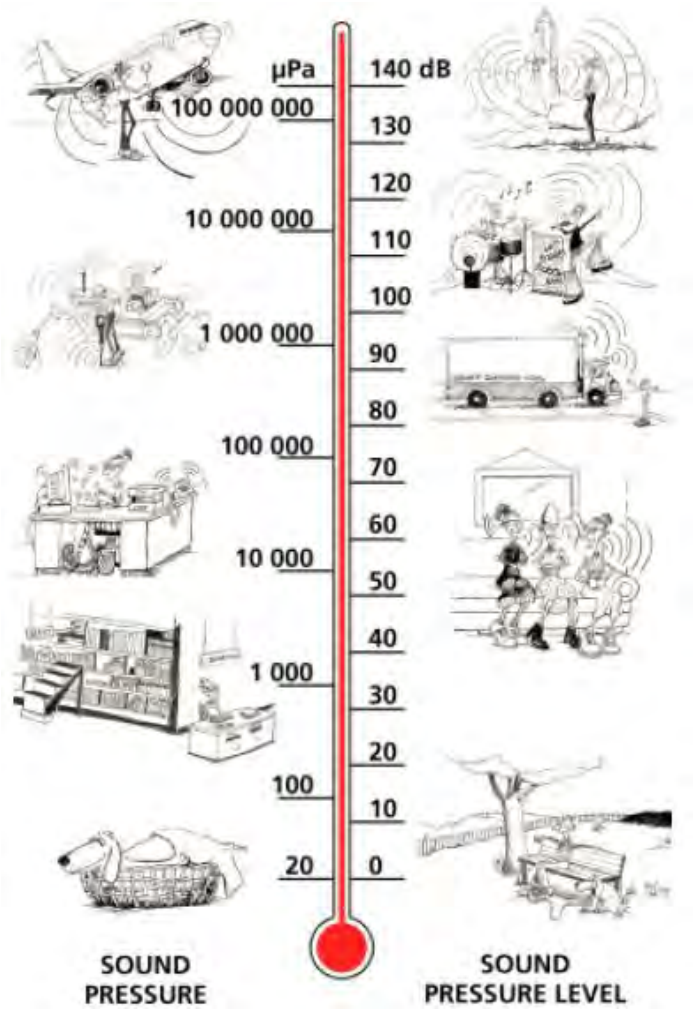


Figure 2: The decibel scale and typical noise levels (Brüel & Kjær Sound & Vibration Measurement A/S, 2000)

1.5.1 Perception of Sound

Sound has already been defined as any pressure variation that can be detected by the human ear. The number of pressure variations per second is referred to as the frequency of sound and is measured in hertz (Hz). The hearing frequency of a young, healthy person ranges between 20 Hz and 20 000 Hz.

In terms of L_P, audible sound ranges from the threshold of hearing at 0 dB to the pain threshold of 130 dB and above. Even though an increase in sound pressure level of 6 dB represents a doubling in sound pressure, an increase of 8 to 10 dB is required before the sound subjectively appears to be significantly louder. Similarly, the smallest perceptible change is about 1 dB (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

1.5.2 Frequency Weighting

Since human hearing is not equally sensitive to all frequencies, a 'filter' has been developed to simulate human hearing. The 'A-weighting' filter simulates the human hearing characteristic, which is less sensitive to sounds at

low frequencies than at high frequencies (Figure 3). “dBA” is the descriptor that is used to indicate 10 times a logarithmic ratio of quantities, that have the same units (in this case sound pressure) that have been A-weighted.

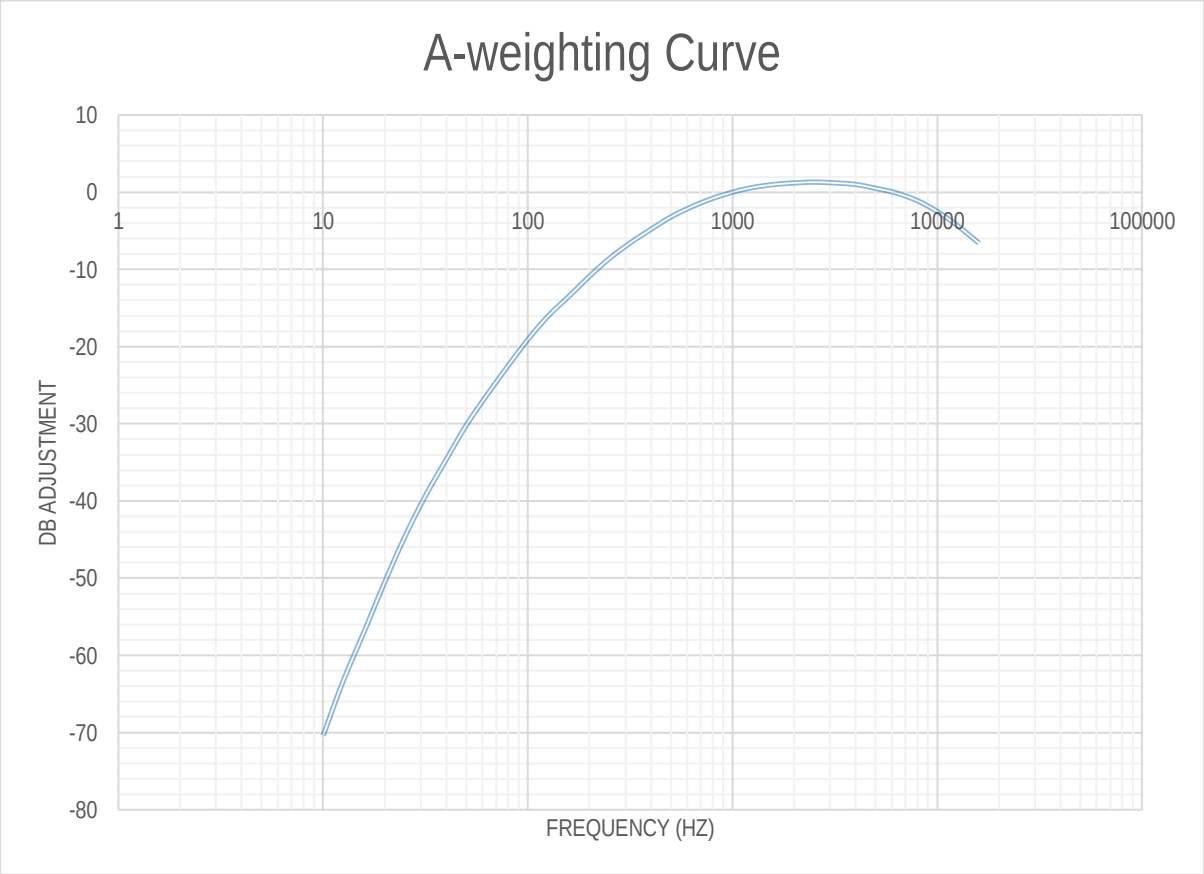


Figure 3: A-weighting curve

1.5.3 Adding Sound Pressure Levels

Since sound pressure levels are logarithmic values, the sound pressure levels as a result of two or more sources cannot simply be added together. To obtain the combined sound pressure level of a combination of sources such as those at an industrial plant, individual sound pressure levels must be converted to their linear values and added using:

$$L_{p\_combined} = 10 \cdot \log\left(10^{\frac{L_{p1}}{10}} + 10^{\frac{L_{p2}}{10}} + 10^{\frac{L_{p3}}{10}} + \cdots 10^{\frac{L_{pi}}{10}}\right)$$

This implies that if the difference between the sound pressure levels of two sources is nil, the combined sound pressure level is 3 dB more than the sound pressure level of one source alone. Similarly, if the difference between the sound pressure levels of two sources is more than 10 dB, the contribution of the quietest source can be disregarded (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

1.5.4 Environmental Noise Propagation

Many factors affect the propagation of noise from source to receiver. The most important of these are:

- The type of source and its sound power (L_W);
- The distance between the source and the receiver;
- Atmospheric conditions (wind speed and direction, temperature and temperature gradient, humidity etc.);
- Obstacles such as barriers or buildings between the source and receiver;
- Ground absorption; and
- Reflections.

To arrive at a representative result from either measurement or calculation, all these factors must be taken into account (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

1.5.5 Environmental Noise Indices

In assessing environmental noise either by measurement or calculation, reference is generally made to the following indices:

- L_{Aeq} (T) – The A-weighted equivalent sound pressure level, where T indicates the time over which the noise is averaged (calculated or measured). The International Finance Corporation (IFC) provides guidance with respect to L_{Aeq} (1 hour), the A-weighted equivalent sound pressure level, averaged over 1 hour.
- L_{Aleq} (T) – The impulse corrected A-weighted equivalent sound pressure level, where T indicates the time over which the noise is averaged (calculated or measured). In the South African Bureau of Standards' (SABS) South African National Standard (SANS) 10103 of 2008 for 'The measurement and rating of environmental noise with respect to annoyance and to speech communication' prescribes the sampling of L_{Aleq} (T).
- $L_{Req,d}$ – The L_{Aeq} rated for impulsive sound (L_{Aleq}) and tonality in accordance with SANS 10103 for the day-time period, i.e. from 06:00 to 22:00.
- $L_{Req,n}$ – The L_{Aeq} rated for impulsive sound (L_{Aleq}) and tonality in accordance with SANS 10103 for the night-time period, i.e. from 22:00 to 06:00.
- $L_{R,dn}$ – The L_{Aeq} rated for impulsive sound (L_{Aleq}) and tonality in accordance with SANS 10103 for the period of a day and night, i.e. 24 hours, and wherein the $L_{Req,n}$ has been weighted with 10 dB in order to account for the additional disturbance caused by noise during the night.
- L_{A90} – The A-weighted 90% statistical noise level, i.e. the noise level that is exceeded during 90% of the measurement period. It is a very useful descriptor which provides an indication of what the L_{Aeq} could have been in the absence of noisy single events and is considered representative of background noise levels.
- L_{AFmax} – The maximum A-weighted noise level measured with the fast time weighting. It's the highest level of noise that occurred during a sampling period.

1.6 Approach and Methodology

The assessment included a study of the legal requirements pertaining to environmental noise impacts, a study of the physical environment of the area surrounding the project and the analyses of existing noise levels in the area. The impact assessment focused on the estimation of sound power levels (L_W's) (noise 'emissions') and sound pressure levels (L_P's) (noise impacts) associated with the operational phase. The findings of the assessment components informed recommendations of management measures, including mitigation and monitoring. Individual aspects of the noise impact assessment methodology are discussed in more detail below.

1.6.1 Information Review

An information requirements list was submitted to ABS Africa at the onset of the project. In response to the request, the following information was supplied:

- Project and site layout maps;
- Mining Work Programme; and,
- Social Labour Plan.

1.6.2 Review of Assessment Criteria

In South Africa, provision is made for the regulation of noise under the National Environmental Management Air Quality Act (NEMAQA) (Act. 39 of 2004) but environmental noise limits have yet to be set. It is believed that when published, national criteria will make extensive reference to SANS 10103 of 2008 '*The measurement and rating of environmental noise with respect to annoyance and to speech communication'*. This standard has been widely applied in South Africa and is frequently used by local authorities when investigating noise complaints. These guidelines, which are in line with those published by the IFC in their *General Environmental, Health, and Safety (EHS) Guidelines* and World Health Organisation (WHO) *Guidelines for Community Noise*, were considered in the assessment.

1.6.3 Study of the Receiving Environment

NSRs generally include private residences, community buildings such as schools, hospitals and any publicly accessible areas outside an industrial facility's property.

The ability of the environment to attenuate noise as it travels through the air was studied by considering local meteorology, land use and terrain. Atmospheric attenuation potential was described based on MM5[2] meteorological data for the period 2016 to 2018.

[2]MM5 is a widely-used three-dimensional numerical meteorological model which contains non-hydrostatic dynamics, a variety of physics options for parameterizing cumulus clouds, microphysics, the planetary boundary layer and atmospheric radiation. MM5 has the capability to perform Four Dimensional Data Assimilation (FDDA), and are able to simulate a variety of meteorological phenomena such as tropical cyclones, severe convective storms, sea-land breezes, and terrain forced flows such as mountain valley wind systems.

Readily available terrain data was obtained from the United States Geological Survey (USGS) web site (https://earthexplorer.usgs.gov/). A study was made of Shuttle Radar Topography Mission (STRM) 1 arc-sec data.

1.6.4 Noise Survey

The extent of noise impacts as a result of an intruding noise depends largely on existing noise levels in an area. Higher ambient noise levels will result in less noticeable noise impacts and a smaller impact area. The opposite also holds true. Increases in noise will be more noticeable in areas with low ambient noise levels. The data from a baseline noise surveys conducted on 29 and 30 January was studied to determine current noise levels within the area.

The survey methodology, which closely followed guidance provided by the IFC (2007) and SANS 10103 (2008), is summarised below:

- The survey was designed and conducted by a trained specialist.
- Sampling was carried out using a Type 1 sound level meter (SLM) that meets all appropriate International Electrotechnical Commission (IEC) standards and is subject to calibration by an accredited laboratory (Appendix A). Equipment details are included in Table 1.
- The acoustic sensitivity of the SLM was tested with a portable acoustic calibrator before and after each sampling session.
- Samples, 15 to 30 minutes in duration, representative and sufficient for statistical analysis were taken with the use of the portable SLM capable of logging data continuously over the sampling time period. Samples representative of the day- and night-time acoustic environment were taken. SANS 10103 defines day-time as between 06:00 and 22:00 and night-time between 22:00 and 06:00 (SANS 10103, 2008).
- L_{Aleq} (T), L_{Aeq} (T); L_{AFmax}; L_{AFmin}; L_{90} and 3rd octave frequency spectra were recorded.
- The SLM was located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface.
- SANS 10103 states that one must ensure (as far as possible) that the measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer.
- A detailed log and record were kept. Records included site details, weather conditions during sampling and observations made regarding the acoustic environment of each site.

Table 1: Sound level meter details

Equipment	Serial Number	Purpose	Last Calibration Date
Brüel & Kjær Type 2250 Lite SLM	S/N 2731851	Attended 30-minute sampling.	10 May 2017
Brüel & Kjær Type 4950 ½" Pre-polarized microphone	S/N 2709293	Attended 30-minute sampling.	10 May 2017
SVANTEK SV33 Class 1 Acoustic Calibrator	S/N 57649	Testing of the acoustic sensitivity before and after each daily sampling session.	29 May 2018

Equipment	Serial Number	Purpose	Last Calibration Date
Kestrel 4000 Pocket Weather Tracker	S/N 559432	Determining wind speed, temperature and humidity during sampling.	Not Applicable

SANS 10103 (2008) prescribes the method for the calculation of the equivalent continuous rating level ($L_{Req,T}$) from measurement data. $L_{Req,T}$ is the equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$) during a specified time interval, plus specified adjustments for tonal character, impulsiveness of the sound and the time of day; and derived from the applicable equation:

$$L_{Req,T} = L_{Aeq,T} + C_i + C_t + K_n$$

Where

- $L_{Req,T}$ is the equivalent continuous rating level;
- $L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels;
- C_i is the impulse correction;
- C_t is the correction for tonal character; and
- K_n is the adjustment for the time of day (or night), 0 dB for daytime and +10 dB for night-time.

Instrumentation used in this survey are capable of integrating while using the I-time (impulse) weighting and $L_{Aleq,T}$ directly measured. When using $L_{Aleq,T}$, only the tonal character correction and time of day adjustment need to be applied to derive $L_{Req,T}$.

If audible tones such as whines, whistles, hums, and music, are present as determined by the procedure given hereafter (e.g. if the noise contains discernible pitch), then C_t = +5 dBA may be used. If audible tones are not present, then C_t = 0 should be used. Note however that the method described in SANS 10103 is only recommended if there is uncertainty as to the presence of pitch and is considered a recommendation, not a requirement. The correction is predominantly the result of the subjective opinion of the specialist.

The presence of tones can be determined as follows (SANS 10103, 2008): Using a one-third octave band filter, which complies with the requirements of IEC 61260, the time average sound pressure level in the one-third octave band that contains the tone to be investigated as well as the time average one-third octave band sound pressure level in the adjacent bands to the one that contains the tone frequency should be measured. The difference between the time average sound pressure levels in the two adjacent one-third octave bands should be determined with the time average sound pressure level of the one-third octave band that contains the tone frequency. A level difference between the one-third octave band that contains the tone frequency and the two adjacent one-third octave bands should exceed the limits given in Table 2 to indicate the presence of a tonal component.

NOTE: the adjustment for tonality was only applied if the tone was clearly identifiable as being generated by human activities and not birds or insects.

Table 2: Level differences for the presence of a tonal component

Centre frequencies of 3rd octave bands (Hz)	Minimum 3rd octave band L_P difference (dB)
25 to 125	15
160 to 400	8
500 to 10 000	5

The equivalent continuous day/night rating level can be calculated using the following equation:

$$L_{R,dn} = \left[\left(\frac{d}{24}\right)10^{L_{Req,d}/10} + \left(\frac{24-d}{24}\right)10^{(L_{Req,n}+k_n)/10}\right]$$

Where

- $L_{R,dn}$ is the equivalent continuous day/night rating level;
- D is the duration of the day-time reference time period (06:00 to 22:00);
- $L_{Req,d}$ is the equivalent continuous rating level determined for the day-time reference time period (06:00 to 22:00);
- $L_{Req,n}$ is the equivalent continuous rating level determined for the night-time reference time period (22:00 to 06:00); and
- K_n is the adjustment 10 dB that should be added to the night-time equivalent continuous rating level.

NOTE: If no tonal correction is made, L_{Aleq} is equivalent to $L_{Req,T}$.

1.6.5 Source Inventory

Noise emissions from all opencast equipment including articulated dump trucks, dozers, bowsers, graders, tractor-loader-backhoes, light delivery vehicles and a single delivery truck were estimated using L_W predictions for industrial machinery (Bruce & Moritz, 1998), where L_W estimates are a function of the power rating of the equipment engine. The proposed ventilation shaft for the underground mining section was also determined by L_W predictions for industrial machinery (Bruce & Moritz, 1998). Handling operations, the proposed surface conveyor, primary and secondary crusher noise emissions were based on similar operations recorded noise profiles. See Table 7 and Table 8 for a detailed description of noise emissions from proposed activities.

1.6.6 Noise Propagation Simulations

The propagation of noise from proposed activities was simulated with the DataKustic CadnaA software. Use was made of the International Organisation for Standardization's (ISO) 9613 module for outdoor noise propagation from industrial noise sources.

ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions favourable to propagation from

sources of known sound emission. These conditions are for downwind propagation or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The method also predicts an average A-weighted sound pressure level. The average A-weighted sound pressure level encompasses levels for a wide variety of meteorological conditions. The method specified in ISO 9613 consists specifically of octave-band algorithms (with nominal midband frequencies from 63 Hz to 8 kHz) for calculating the attenuation of sound which originates from a point sound source, or an assembly of point sources. The source (or sources) may be moving or stationary. Specific terms are provided in the algorithms for the following physical effects; geometrical divergence, atmospheric absorption, ground surface effects, reflection and obstacles. A basic representation of the model is given in the equation below:

$$L_P = L_W - \sum [K_1, K_2, K_3, K_4, K_5, K_6]$$

Where;

L_P is the sound pressure level at the receiver;
L_W is the sound power level of the source;
K_1 is the correction for geometrical divergence;
K_2 is the correction for atmospheric absorption;
K_3 is the correction for the effect of ground surface;
K_4 is the correction for reflection from surfaces; and
K_5 is the correction for screening by obstacles.

This method is applicable in practice to a great variety of noise sources and environments. It is applicable, directly or indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground-based noise sources.

To apply the method of ISO 9613, several parameters need to be known with respect to the geometry of the source and of the environment, the ground surface characteristics, and the source strength in terms of octave-band sound power levels for directions relevant to the propagation.

If the dimensions of a noise source are small compared with the distance to the listener, it is called a point source. All sources were quantified as point sources or areas/lines represented by point sources. The sound energy from a point source spreads out spherically, so that the sound pressure level is the same for all points at the same distance from the source and decreases by 6 dB per doubling of distance. This holds true until ground and air attenuation noticeably affect the level. The impact of an intruding industrial noise on the environment will therefore rarely extend over more than 5 km from the source and is therefore always considered “local” in extent.

The propagation of noise was calculated over an area of 49.1 km east-west by 48.9 km north-south and encompasses the project. The area was divided into a grid matrix with a 50 m resolution. NSRs and survey locations were included as discrete receptors. The model was set to calculate L_P’s at each grid and discrete receptor point at a height of 1.5 m above ground level.

1.6.7 Presentation of Results

Noise impacts were calculated in terms of:

- The day-time noise level (L_{Aeq});
- The night-time noise level (L_{Aeq}); and
- The equivalent day/night noise level (L_{Aeq}).

Results are presented in isopleth form. An isopleth is a line on a map connecting points at which a given variable (in this case sound pressure, L_P) has a specified constant value. This is analogous to contour lines on a map showing terrain elevation. In the assessment of environmental noise, isopleths present lines of constant noise level as a function of distance.

Simulated noise levels were assessed according to guidelines published in SANS 10103 and by the IFC. To assess annoyance at nearby places of residence, the increase in noise levels above the baseline at NSRs were calculated and compared to guidelines published in SANS 10103.

1.6.8 Recommendations of Management and Mitigation

The findings of the noise specialist study informed the recommendation of suitable noise management and mitigation measures.

1.6.9 Impact Significance Assessment

The significance of environmental noise impacts was assessed according to the methodology adopted by ABS Africa and considered both an unmitigated and mitigated scenario. Refer to Appendix E of this report for the methodology.

1.7 Limitations and Assumptions

The following limitations and assumptions should be noted:

- The mitigating effect of infrastructure acting as acoustic barriers was not taken into account, providing a conservative assessment of the noise impacts off-site.
- The quantification of sources of noise was limited to the operational phase of the project. Construction and closure phase activities are expected to be similar or less significant and its impacts only assessed qualitatively. Noise impacts from the proposed ventilation shaft will cease post-closure.
- All activities were assumed to be 24 hours per day, 7 days per week.
- Although other existing sources of noise within the area were identified, such sources were not quantified but were taken into account during the survey.
- Blast vibration and blast noise did not form part of the scope of work of this assessment.

2 Legal Requirements and Noise Level Guidelines

2.1 South African National Standards

SANS 10103 (2008) addresses the manner in which environmental noise measurements are to be taken and assessed in South Africa, and is fully aligned with the World Health Organisation (WHO) guidelines for Community Noise (WHO, 1999). It should be noted that the values given in Table 3 are typical rating levels that it is recommended should not be exceeded outdoors in the different districts specified. Outdoor ambient noise exceeding these levels will be annoying to the community.

Table 3: Typical rating levels for outdoor noise

Type of district	Equivalent Continuous Rating Level ($L_{Req,T}$) for Outdoor Noise		
	Day/night $L_{R,dn}$[(c)] (dBA)	Day-time $L_{Req,d}$[(a)] (dBA)	Night-time $L_{Req,n}$[(b)] (dBA)
Rural districts	45	45	35
Suburban districts with little road traffic	50	50	40
Urban districts	55	55	45
Urban districts with one or more of the following; business premises; and main roads.	60	60	50
Central business districts	65	65	55
Industrial districts	70	70	60

Notes

(a) $L_{Req,d}$ =The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the day-time period, i.e. from 06:00 to 22:00.

(b) $L_{Req,n}$ =The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the night-time period, i.e. from 22:00 to 06:00.

(c) $L_{R,dn}$ =The L_{Aeq} rated for impulsive sound and tonality in accordance with SANS 10103 for the period of a day and night, i.e. 24 hours, and wherein the $L_{Req,n}$ has been weighted with 10dB in order to account for the additional disturbance caused by noise during the night.

SANS 10103 also provides a useful guideline for estimating community response to an increase in the general ambient noise level caused by intruding noise. If Δ is the increase in noise level, the following criteria are of relevance:

- "$\Delta \leq 0$ dB: There will be no community reaction;
- 0 dB < $\Delta \leq$ 10 dB: There will be 'little' reaction with 'sporadic complaints';
- 5 dB < $\Delta \leq$ 15 dB: There will be a 'medium' reaction with 'widespread complaints'. Δ = 10 dB is subjectively perceived as a doubling in the loudness of the noise;
- 10 dB < $\Delta \leq$ 20 dB: There will be a 'strong' reaction with 'threats of community action'; and
- 15 dB < Δ: There will be a 'very strong' reaction with 'vigorous community action'.

The categories of community response overlap because the response of a community does not occur as a stepwise function, but rather as a gral change.

2.2 International Finance Corporation Guidelines on Environmental Noise

The IFC General Environmental Health and Safety Guidelines on noise address impacts of noise beyond the property boundary of the facility under consideration and provides noise level guidelines.

The IFC states that noise impacts should not exceed the levels presented in Table 4, or result in a maximum increase above background levels of 3 dBA at the nearest receptor location off-site (IFC, 2007). For a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level is not detectable. Δ = 3 dBA is, therefore, a useful significance indicator for a noise impact.

It is further important to note that the IFC noise level guidelines for residential, institutional and educational receptors correspond with the SANS 10103 guidelines for urban districts.

Table 4: IFC noise level guidelines

Area	One Hour L_{Aeq} (dBA) 07:00 to 22:00	One Hour L_{Aeq} (dBA) 22:00 to 07:00
Industrial receptors	70	70
Residential, institutional and educational receptors	55	45

2.3 Criteria Applied in this Assessment

Reference is made to the IFC noise guideline level for residential, institutional and educational receptors and the increase in noise levels of 3 dBA above background levels.

3 Description of the Receiving Environment

This chapter provides details of the receiving acoustic environment which is described in terms of:

- Local NSRs;
- The local environmental noise propagation and attenuation potential; and
- Current noise levels and the existing acoustic climate.

3.1 Noise Sensitive Receptors

Noise sensitive receptors generally include places of residence and areas where members of the public may be affected by noise generated by mining, processing and transport activities.

As mentioned in Section 1.6.6, the impact of an intruding industrial/mining noise on the environment rarely extends over more than 5 km from the source. Noise sensitive receptors within 5 km of the project (indicated in Figure 4), include individual homesteads and small informal settlements.

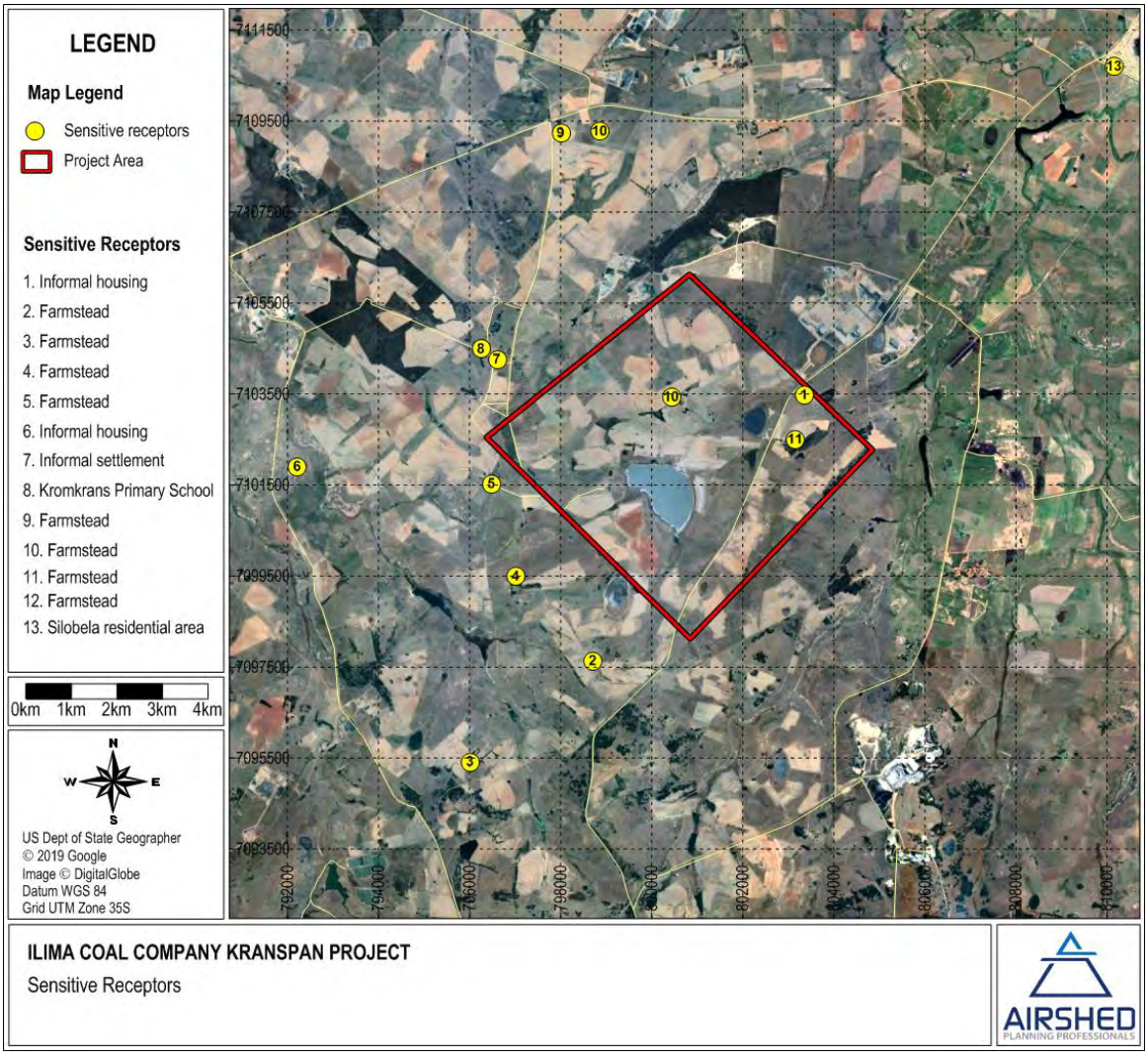


Figure 4: Sensitive receptors within the study area

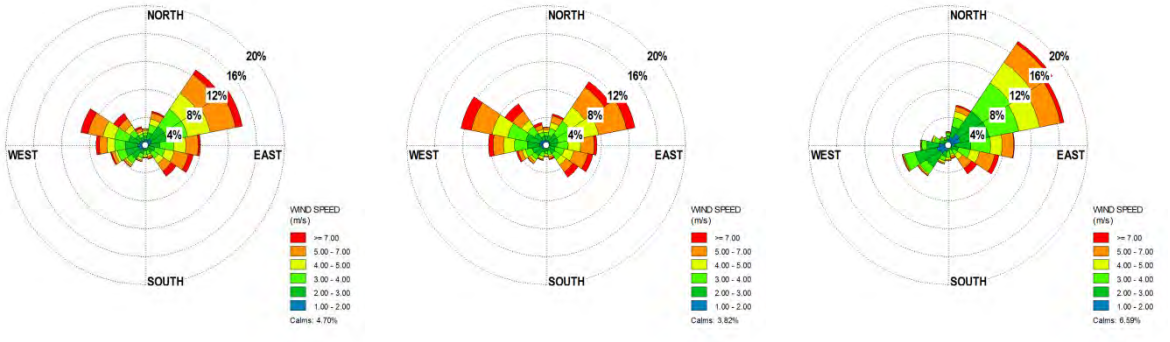
3.2 Environmental Noise Propagation and Attenuation potential

3.2.1 Atmospheric Absorption and Meteorology

Atmospheric absorption and meteorological conditions have already been mentioned with regards to their role in the propagation on noise from a source to receiver (Section 1.5.4). The main meteorological parameters affecting the propagation of noise include wind speed, wind direction and temperature. These along with other parameters such as relative humidity, air pressure, solar radiation and cloud cover affect the stability of the atmosphere and the ability of the atmosphere to absorb sound energy.

Wind speed increases with altitude. This results in the 'bending' of the path of sound to 'focus' it on the downwind side and creating a 'shadow' on the upwind side of the source. Depending on the wind speed, the downwind level may increase by a few dB but the upwind level can drop by more than 20 dB (Brüel & Kjær Sound & Vibration Measurement A/S, 2000). It should be noted that at wind speeds of more than 5 m/s, ambient noise levels are mostly dominated by wind generated noise.

Preliminary data from the MM5 data for the period 2016 to 2018 was used for the assessment. The modelled data set indicates wind flow primarily from the northeast and west-northwest (Figure 5 (a)). At night, wind shifted to be mostly from the northeast. On average, noise impacts are expected to be more notable southwest and east-southeast the project activities.



(a) Period average wind rose

(b) Day-time wind rose (06:00 – 22:00)

(c) Night-time wind rose (22:00 – 06:00)

Figure 5: Wind rose for MM5 data, 1 January 2016 to 31 December 2018

Temperature gradients in the atmosphere create effects that are uniform in all directions from a source. On a sunny day with no wind, temperature decreases with altitude and creates a 'shadowing' effect for sounds. On a clear night, temperatures may increase with altitude thereby 'focusing' sound on the ground surface. Noise impacts are therefore generally more notable during the night.

3.2.2 Terrain, Ground Absorption and Reflection

Noise reduction caused by a barrier (i.e. natural terrain, installed acoustic barrier, building) feature depends on two factors namely the path difference of a sound wave as it travels over the barrier compared with direct transmission to the receiver and the frequency content of the noise (Brüel & Kjær Sound & Vibration Measurement A/S, 2000). The topography[3] for the study area is provided in Figure 6.

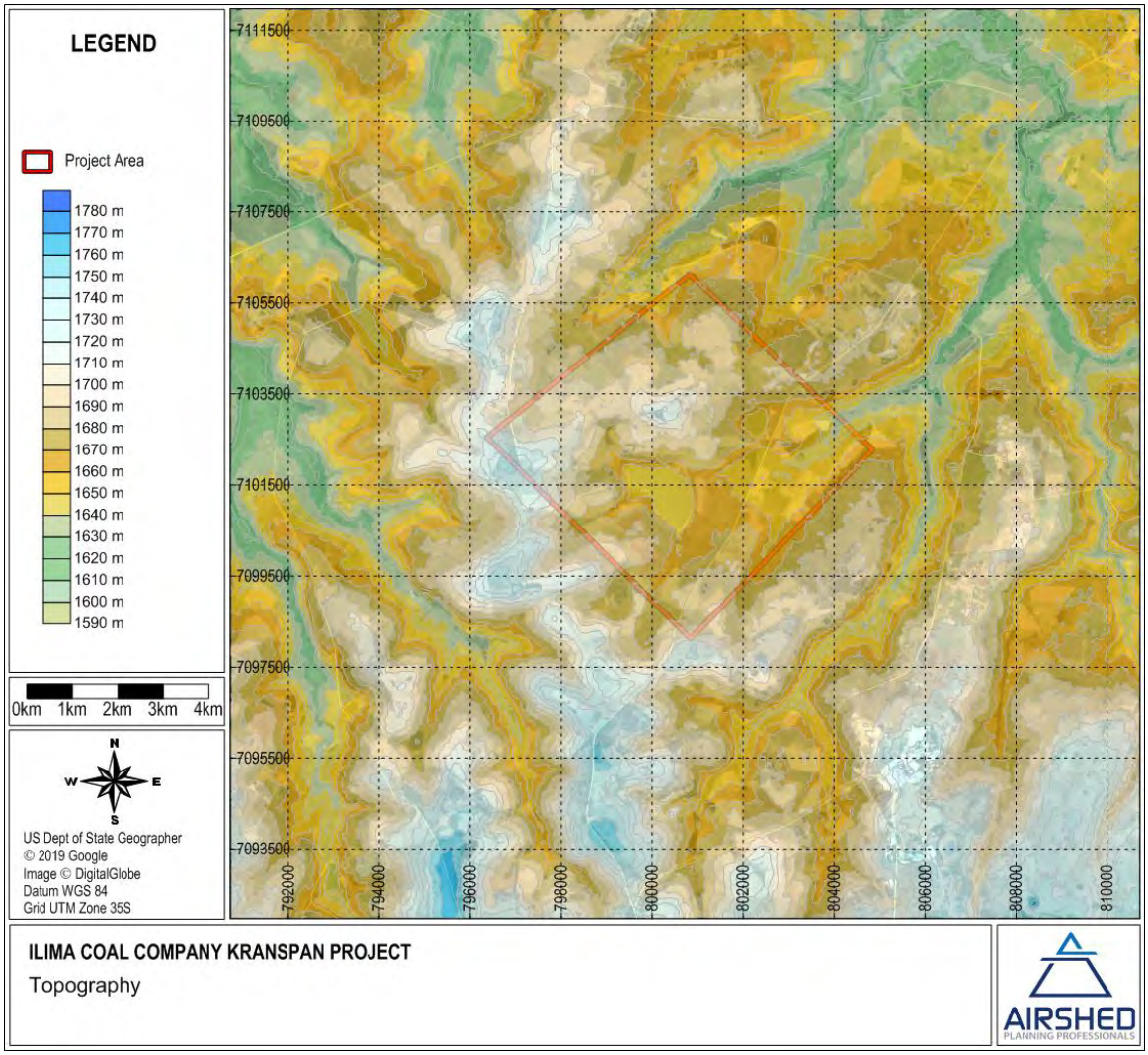


Figure 6: Topography for the study area

Sound reflected by the ground interferes with the directly propagated sound. The effect of the ground is different for acoustically hard (e.g., concrete or water), soft (e.g., grass, trees or vegetation) and mixed surfaces. Ground attenuation is often calculated in frequency bands to take into account the frequency content of the noise source and the type of ground between the source and the receiver (Brüel & Kjær Sound & Vibration Measurement A/S, 2000). Based on observations made during the visit to site, ground cover was found to be acoustically mixed.

[3] SRTM1 from the United States Geological Survey at https://earthexplorer.usgs.gov

3.3 Baseline Noise Survey and Results

Survey sites were selected after careful consideration for future mining activities planned at Kranspan, accessibility, potential noise sensitive receptors, and safety restrictions. A total of five survey sites were selected. The locations of these, with coordinates, are provided in Table 5 and shown in Figure 7. Verkeerdepan Mine is located directly northeast of the proposed project.

Table 5: Location of the baseline noise survey sites

Site ID	Latitude	Longitude
Site KN 1	26.165818°S	30.030157°E
Site KN 2	26..154954°S	30.033116°E
Site KN 3	26.157494°S	30.008979°E
Site KN 4	26.140449°S	29.971916°E
Site KN 5	26.183146°S	29.984427°E

Figure 7: Locations of environmental baseline noise survey sites

Survey results are summarised in Table 6 and for comparison purposes, visually presented in Figure 8 (day-time results) and Figure 9 (night-time results).

Table 6: The project baseline environmental noise survey results summary

	Date and time	Duration	L_{AFmax} (dBA)	L_{AIeq} (dBA)	L_{Aeq} (dBA)	L_{A90} (dBA)	Observations
Day-time							
Site KN 1 Informal community	29/01/2019 12:52	00:30:00	81.54	65.65	63.61	33.28	Close to the R36. Very busy road. Verkeerdepan Mine across the road is audible.
Site KN 2 Farm house	29/01/2019 13:33	00:24:03	58.75	43.68	42.28	35.42	Close to the R36. Tall trees and long grass. Audible house work (grinding). Non-electric wire fence and transformer
Site KN 3 Farm house	29/01/2019 14:09	00:21:02	56.64	39.24	34.37	25.35	Livestock, tall trees, short grass, maize fields, non-electric wire fence.
Site KN 4 Farm house	29/01/2019 15:32	00:22:09	67.19	42.3	37.85	22.66	Long grass, non-electric wire fence
Site KN 5 Farm house	29/01/2019 14:54	00:20:03	67.97	44.93	39.83	22.28	Livestock, long grass, non-electric wire fence.
Night-time							

Site KN 1 Informal community	29/01/2019 23:35	00:15:46	91.47	36.48	66.22	61.59	Close to the R36. Tall trees and long grass. Mining activity audible from Verkeerdepan Mine. non-electric wire fence and transformer.
Site KN 2 Farm house	30/01/2019 00:01	00:15:37	51.75	30.8	41.98	37.75	Close to the R36. Very busy road. Mining activity audible from Verkeerdepan Mine.
Site KN 3 Farm house	30/01/2019 00:29	00:16:01	58.17	32.36	42.91	41.58	Livestock, tall trees, short grass, maize fields, non-electric wire fence. Mining activity audible from Verkeerdepan Mine
Site KN 4 Farm house	30/01/2019 01:30	00:15:59	49.53	32.08	37.98	36.75	Long grass, non-electric wire fence. Mining activity audible from Verkeerdepan Mine. Frogs
Site KN 5 Farm house	30/01/2019 01:01	00:15:34	49.24	30.22	44.37	42.18	Livestock, long grass, non-electric wire fence. Mining activity audible from Verkeerdepan Mine. Frogs

The following is noted:

- Measurements were conducted on 29 and 30 January 2019.
- Weather conditions:
    - During the day weather conditions started out mostly cloudy (80%-60%) but cleared up as measurements continued, with temperatures between 20 °C and 26°C. Slight wind conditions with wind speeds between 1 and 2 m/s mostly from a westerly direction.
    - At night, skies were clear with temperatures between 16°C and 18°C. Slight wind conditions with wind speeds between 0.5 and 1 m/s mostly from a northerly direction.
- Through subjective observations during measurements and frequency analysis of recorded 3rd octave frequency spectra, it was determined that pure tones were not present during any of the measurements.
- Day-time baseline noise levels:
    - Measurements indicate day-time ambient noise levels that are comparatively quiet but influenced by occasional noisy incidents such as vehicle passing by.
    - L_{Aeq}'s ranged between 34 dBA and 63 dBA which is considered typical of rural to urban areas according to SANS 10103.

    - Recorded L_{Aeq}'s during the day were within IFC guidelines for residential, institutional and educational receptors (55 dBA) with the exception of site KN 1 (63 dBA).
- Night-time baseline noise levels:
    - Measurements indicate night-time ambient noise levels that are quiet but influenced by occasional noisy incidents such as vehicle passing by.
    - Mining activities from Verkeerdepan Mine were clearly audible at all 5 sites (KN 1 to KN 5) during the night.
    - On-site L_{Aeq}'s ranged between 37 dBA and 62 dBA which is considered typical of rural to urban areas according to SANS 10103.
    - Recorded L_{Aeq}'s during the night were within IFC guidelines for residential, institutional and educational receptors (45 dBA) with the exception of Site KN 1 (62 dBA).

For detailed time-series, frequency spectra and statistical results, the reader is referred to Appendix D. Field log sheets containing weather records are included in Appendix C.

The baseline noise levels for all sampling sites within the study area is provided in Figure 10.

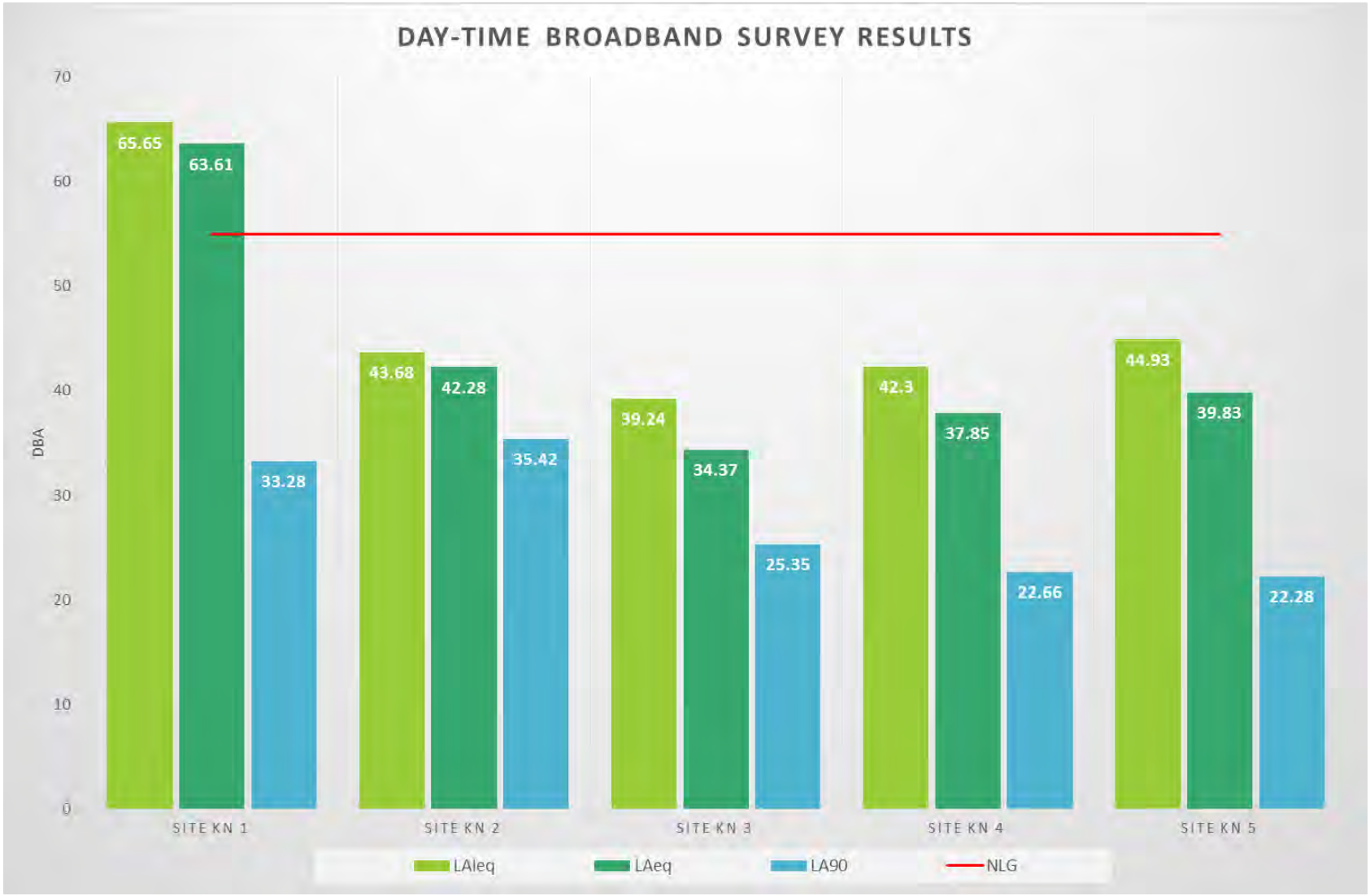


Figure 8: Day-time broadband survey results

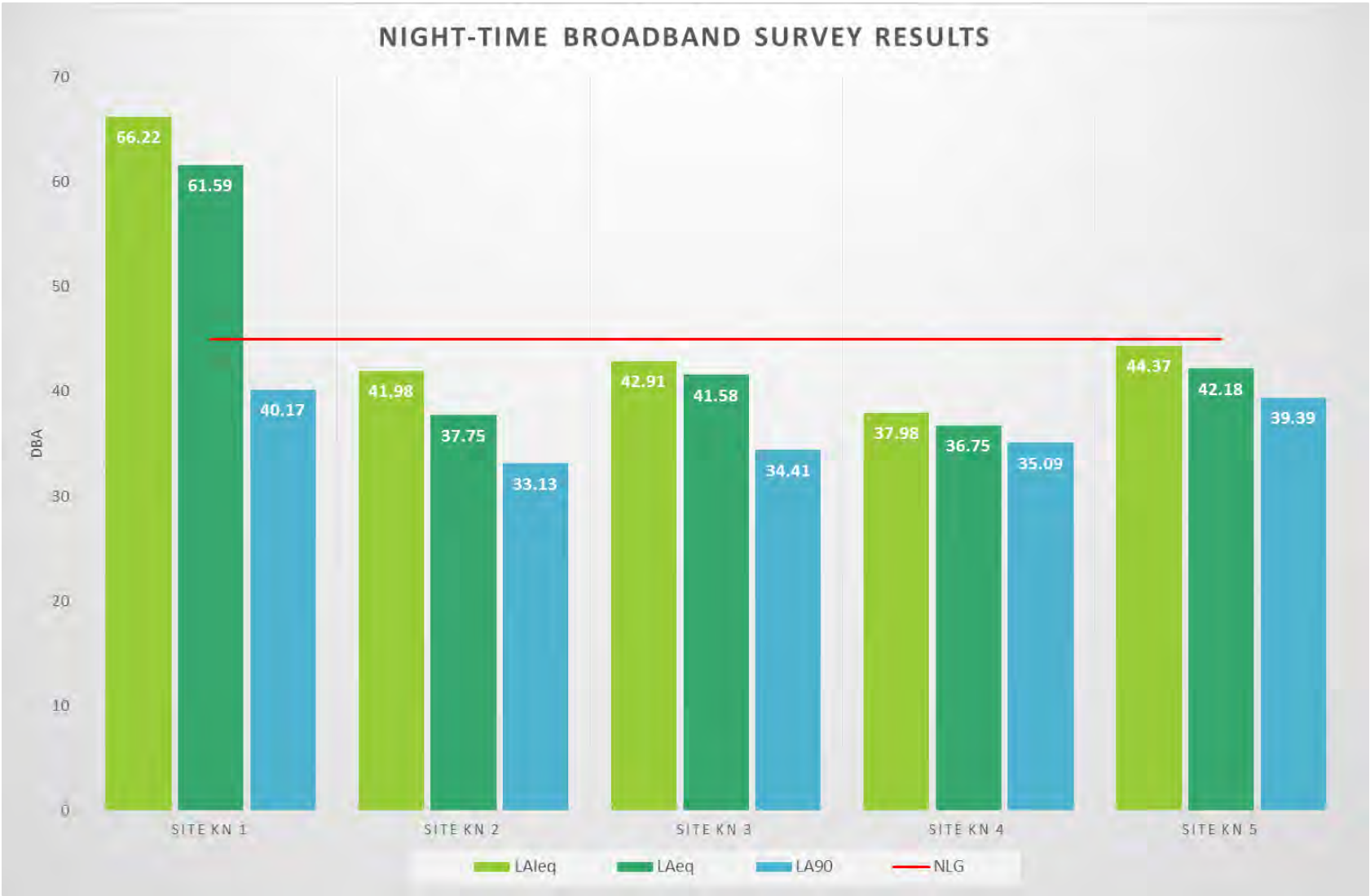


Figure 9: Night-time broadband survey results

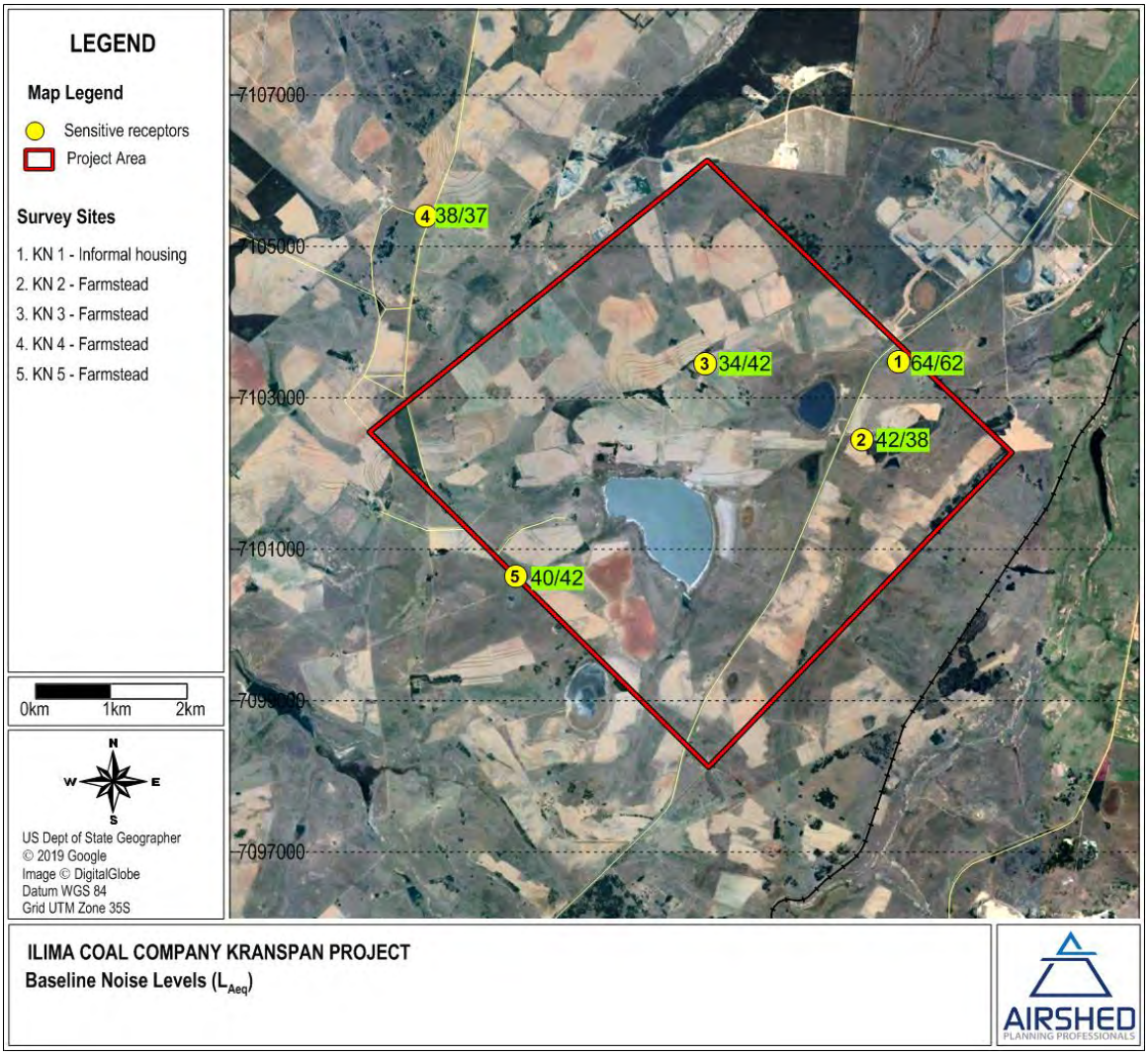


Figure 10: Baseline noise levels (L_{Aeq}) (first level is day-time, and second level is night-time)

4 Impact Assessment

The noise source inventory, noise propagation modelling and results are discussed in Section 4.1 and Section 4.2 respectively.

4.1 Noise Sources and Sound Power Levels

The complete source inventory for the project is included in Table 7. Octave band frequency spectra L_W's are included in Table 8.

The reader is reminded of the non-linearity in the addition of L_W's. If the difference between the sound power levels of two sources is nil the combined sound power level is 3 dB more than the sound pressure level of one source alone. Similarly, if the difference between the sound power levels of two sources is more than 10 dB, the contribution of the quietest source can be disregarded (Brüel & Kjær Sound & Vibration Measurement A/S, 2000).

Table 7: Noise source inventory for the project

Source Name	Source type	Equipment ID	Qty.	Vehicles per hour	Speed (km/h)	Operating time, day and night-time hours		Week Days	L_W (dB)
VOLVO 35T	Moving point source	ADT	16	11.66	40 (a)	16	8	6	125.2
CAT D9	Area	BULLDOZER	2	0	0	16	8	6	124.4
CAT D6	Area	BULLDOZER	2	0	0	16	8	6	119.8
Water bowser	Area	BOWSER	2	0	0	16	8	6	122.1
Diesel bowser	Area	BOWSER	1	0	0	16	8	6	122.1
CAT 140G	Area	GRADER	2	0	0	16	8	6	121.7
CAT 428	Area	TLB	1	0	0	16	8	6	118.0
Delivery truck	Moving point source	DTRUCK	1	1	40 (a)	16	8	6	119.5
LDVs	Moving point source	LDV	6	3	40 (a)	16	8	6	121.1
Ingesol Rand	Area	PERCUSSION RIG	2	0	0	16	8	6	81.1
Hydraulic Excavator 20t	Area	HYDRAULICEX20	1	0	0	16	8	6	120.5
Hydraulic Excavator 70t	Area	HYDRAULICEX70	4	0	0	16	8	6	125.5
Handling	Area	HANDLING	24	0	0	16	8	6	106.4
Standard Conveyor 5 m/s	Area	CONVEYOR	1	0	0	16	8	6	92.9
Conveyor transfer points	Point source	CONVTRANS	1	0	0	16	8	6	107.3
Default for Heavy Industry	Point source	HEAVYINDUSTRY	1	0	0	16	8	6	65.0
Primary crusher	Point source	PRIMARYCRUSHER	1	0	0	16	8	7	105.2
Secondary crusher	Point source	SECONDARYCRUSHER	1	0	0	16	8	7	118.3
Pumps	Point source	PUMPS	9	0	0	16	8	7	91.6
Vent shaft	Point source	VENT	1	0	0	16	8	7	134.4

(a) Assumed

Table 8: Octave band frequency spectra L_W's

Equipment ID	Equipment details	Type	31.5	L_W octave band frequency spectra (dB)								L_W (dB)	L_{WA} (dBA)	Source
				63	125	250	500	1000	2000	4000	8000			
ADT	VOLVO 35T	L_W		113.6	118.6	121.6	116.6	114.6	111.6	105.6	99.6	125.2	119.8	L_W Predictions (Bruce & Moritz, 1998)
BULLDOZER	CAT D9	L_W		112.8	117.8	120.8	115.8	113.8	110.8	104.8	98.8	124.4	119.1	L_W Predictions (Bruce & Moritz, 1998)
BULLDOZER	CAT D6	L_W		108.2	113.2	116.2	111.2	109.2	106.2	100.2	94.2	119.8	114.4	L_W Predictions (Bruce & Moritz, 1998)
BOWSER	Water bowser	L_W		110.5	115.5	118.5	113.5	111.5	108.5	102.5	96.5	122.1	116.7	L_W Predictions (Bruce & Moritz, 1998)
BOWSER	Diesel bowser	L_W		110.5	115.5	118.5	113.5	111.5	108.5	102.5	96.5	122.1	116.7	L_W Predictions (Bruce & Moritz, 1998)
GRADER	CAT 140G	L_W		110.0	115.0	118.0	113.0	111.0	108.0	102.0	96.0	121.7	116.3	L_W Predictions (Bruce & Moritz, 1998)
TLB	CAT 428	L_W		106.4	111.4	114.4	109.4	107.4	104.4	98.4	92.4	118.0	112.6	L_W Predictions (Bruce & Moritz, 1998)
DTRUCK	Delivery truck	L_W		107.8	112.8	115.8	110.8	108.8	105.8	99.8	93.8	119.5	114.1	L_W Predictions (Bruce & Moritz, 1998)
LDV	Light delivery vehicles	L_W		109.5	114.5	117.5	112.5	110.5	107.5	101.5	95.5	121.1	115.7	L_W Predictions (Bruce & Moritz, 1998)
PERCUSSION RIG	Ingesol Rand	L_W		77.0	77.0	67.0	66.0	70.0	68.0	62.0	56.0	81.1	73.9	L_W Database
HYDRAULICEX20	Hydraulic Excavator 20t	L_W		108.9	113.9	116.9	111.9	109.9	106.9	100.9	94.9	120.5	115.2	L_W Predictions (Bruce & Moritz, 1998)
HYDRAULICEX70	Hydraulic Excavator 70t	L_W		113.9	118.9	121.9	116.9	114.9	111.9	105.9	99.9	125.5	120.1	L_W Predictions (Bruce & Moritz, 1998)
HANDLING	Handling	L_W		80	90	98.8	97.6	100.7	101.4	95.4		106.4	105.8	L_W Database
CONVEYOR	Standard Conveyor 5 m/s	L_W/m		83.4	86.5	84.5	88.7	82.9	76.5	67.3	-	92.9	88.2	L_W Database
CONVTRANS	Conveyor transfer points	L_W		102.7	102.6	107.6	104.6	102.4	99.2	94.4	-	107.3	111.8	L_W Database
PRIMARYCRUSHER	Primary crusher	L_W		99.4	90.9	97.8	98.1	97.3	95.5	92.1	-	105.2	102.1	L_W Database
SECONDARYCRUSHER	Secondary crusher	L_W		107.5	108.4	110.9	112.8	111.9	107.5	103.1		118.3	115.6	L_W Database
PUMPS	Pumps	L_W	79.4	80.4	81.4	83.4	83.4	86.4	83.4	79.4	73.4	91.6	89.9	L_W Predictions (Bruce & Moritz, 1998)
VENT	Vent shaft	L_W	124.0	125.0	126.0	127.0	127.0	127.0	125.0	121.0	120.0	134.4	131.6	L_W Predictions (Bruce & Moritz, 1998)

(a) Specifications assumed based on similar operations

4.2 Noise Propagation and Simulated Noise Levels

The propagation of noise generated during the operational phase was calculated with CadnaA in accordance with ISO 9613. Meteorological and site-specific acoustic parameters as discussed in Section 3.2 along with source data discussed in 4.1, were applied in the model[4].

Table 9 provides a summary of simulated noise levels at NSRs. Results are also presented in isopleth form (Figure 11 to Figure 13). The simulated equivalent continuous day time rating level ($L_{Req,dn}$) of 45 dBA (guideline level) extends ~1000 m from the proposed mining area. The simulated equivalent continuous day/night time rating level ($L_{Req,dn}$) of 55 dBA (guideline level) extends ~900m from the proposed mining area.

The proposed operational phase related noise due to the project is predicted to exceed the selected noise guidelines at KN 2 and KN 3 during the day- and night-time conditions and only during night-time at KN 1 and KN 5. For a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level is not detectable. According to SANS 10103 (2008); 'very strong' reaction may be expected from KN 2 and KN 3 (located within the project area on the proposed opencast area) during day- and night-time conditions, while a 'little' to 'medium' reaction with 'sporadic' to 'widespread' complaints may be expected at KN 5 during- day and night-time conditions.

Table 9: Summary of simulated noise levels (provided as dBA) due to the project only and baseline noise measurements at the closest NSR to the project activities

Noise Sensitive Receptor	Project operations only		Baseline		Increase Above Baseline (c)	
	Day	Night	Day	Night	Day	Night
KN 1	53.3	52.2	63.6	66.2	0.4	0.7
KN 2	80.9	80.1	42.3	41.9	38.6	44.7
KN 3	65.7	64.9	34.4	42.9	31.3	28.5
KN 4	0	0	37.9	37.9	0.0	0.0
KN 5	47	46.2	39.8	44.4	7.9	9.0

Notes:

(a) Assumed based on closest noise sampling location

(b) Exceeds day-time IFC guideline of 55 dBA for residences

(c) Exceeds night-time IFC guideline of 45 dBA for residences

(d) Likely community response:

- 0 to 1 dBA – No reaction, increase not detectable
- 1 to 3 dBA – Increase just detectable to persons with average hearing acuity, annoyance unlikely.
- 3 to 5 dBA – There will be 'little' reaction with 'sporadic complaints'.
- 5 to 10 dBA – There will be 'little' to 'medium' reaction with 'sporadic' to 'widespread' complaints.
- 10 to 15 dBA – There will be a 'strong' reaction with 'threats of community action'.
- > 15 dBA – There will be a 'very strong' reaction with 'vigorous community action'.

[4] A new site layout was introduced after the completion of the current study. The new position of the plant and co-disposal stockpile is now closer to the on-site farmstead located in the centre of the mining property (KN3), but further away from the other on-site receptors, viz. a second on-site farmstead (KN2) and informal community (KN1) respectively. As the farmstead closest to the mining activities has now been bought by the mine and the informal community will be relocated by the Msobo mine prior to construction at Kranspan, the change in position of the plant is not expected to result in higher noise impacts than what was simulated in the impact assessment and the conclusions and recommendations are still valid.

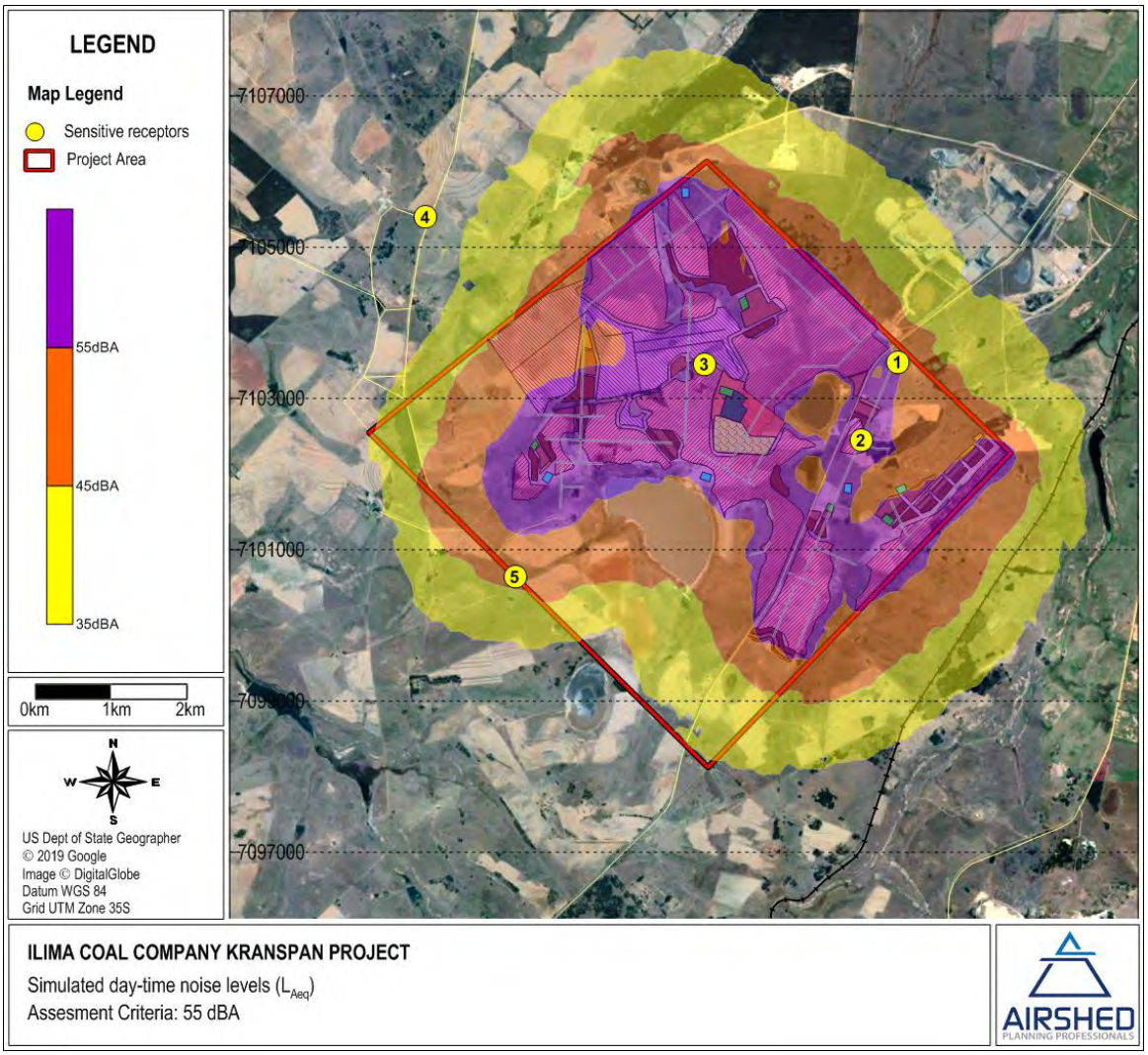


Figure 11: Simulated equivalent continuous day-time rating level ($L_{Req,d}$) for project activities

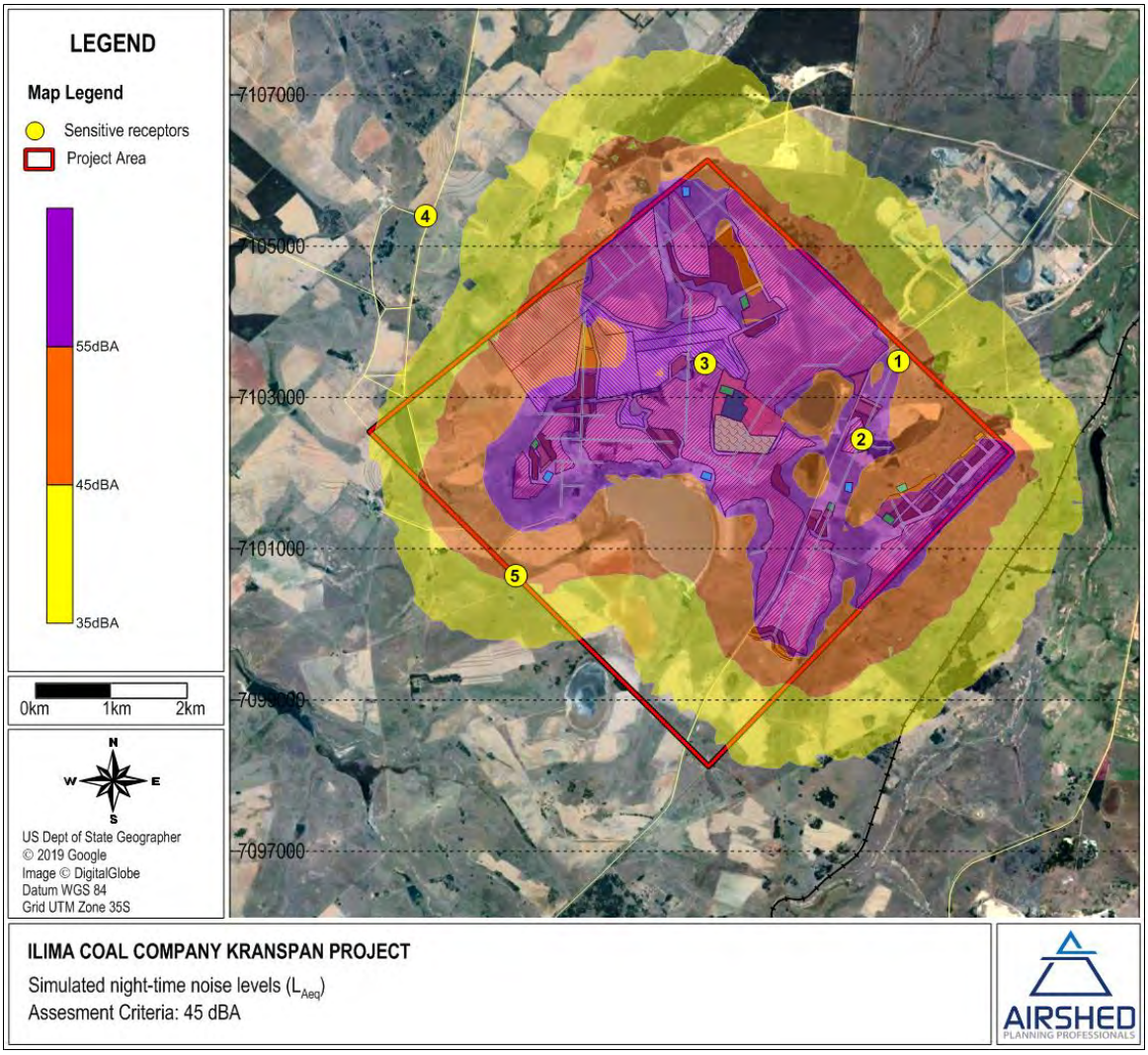


Figure 12: Simulated equivalent continuous night-time rating level ($L_{Req,n}$) for project activities

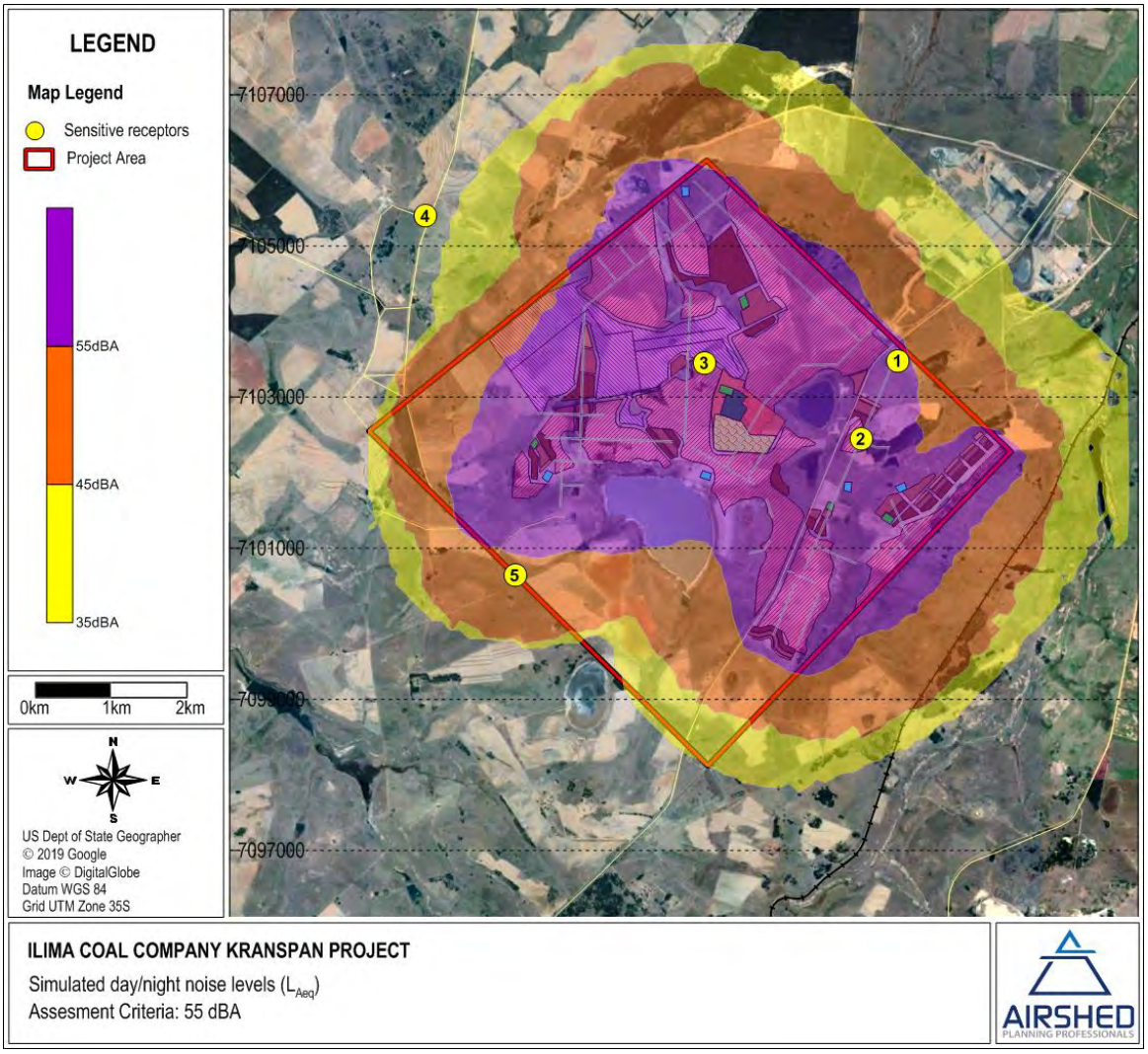


Figure 13: Simulated equivalent continuous day/night time rating level ($L_{Req,dn}$) for project activities

5 Management Measures

In the quantification of noise emissions and simulation of noise levels as a result of the proposed project, it was calculated that ambient noise evaluation criteria for human receptors will be exceeded at KN 1, KN 2, KN 3 and KN5. 'Very strong' reaction may be expected from KN 2 and KN 3 (during the day and night) and a little' to 'medium' reaction with 'sporadic' to 'widespread' complaints reaction may be expected at KN 5 (during the day and night).

From a noise perspective, the project may proceed provided that mitigation measures be implemented to ensure minimal impacts on the surrounding environment.

5.1 Controlling Noise at the Source

5.1.1 Engineering and Operational Practices

For general activities, the following good engineering practice should be applied to all project phases:

- Equipment with lower sound power levels must be selected. Vendors should be required to guarantee optimised equipment design noise levels.
- Where possible, other non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours.
- A noise complaints register must be kept.

5.1.2 Specifications and Equipment Design

As the site or activity is in close proximity to NSRs, equipment and methods to be employed should be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels.

5.1.3 Enclosures

As far as is practically possible, source of significant noise should be enclosed. The extent of enclosure will depend on the nature of the machine and their ventilation requirements. Motors are examples of such equipment. It should be noted that the effectiveness of partial enclosures and screens can be reduced if used incorrectly.

5.1.4 Use and Siting of Equipment and Noise Sources

Plant and equipment should be sited as far away from NSRs as possible. Also:

a) Machines used intermittently should be shut down between work periods or throttled down to a minimum and not left running unnecessarily. This will reduce noise and conserve energy.
b) Plants or equipment from which noise generated is known to be particularly directional, should be orientated so that the noise is directed away from NSRs.
c) Acoustic covers of engines should be kept closed when in use.

d) Construction materials such as beams should be lowered and not dropped.

5.1.5 Maintenance

Regular and effective maintenance of equipment are essential to noise control. Increases in equipment noise are often indicative of eminent mechanical failure. Also, sound reducing equipment/materials can lose effectiveness before failure and can be identified by visual inspection.

Noise generated by friction in conveyor rollers, trolley etc. can be reduced by sufficient lubrication.

5.2 Controlling the Spread of Noise

Naturally, if noise activities can be minimised or avoided, the amount of noise reaching NSRs will be reduced. Alternatively, the distance between source and receiver must be increased, or noise reduction screens, barriers, or berms must be installed.

5.2.1 Distance

To increase the distance between source and receiver is often the most effective method of controlling noise since, for a typical point source at ground level, a 6-dB decrease can be achieved with every doubling in distance. It is however conceded that it might not always be possible.

5.2.2 Location of Processing and Beneficiation Plant

Three plant areas were suggested by ABS Africa as can be seen below in Error! Reference source not found.. The preferred area reflects the new position of the plant and co-disposal stockpile as indicated in the site layout proposed on 20 May 2019 (see Figure 31). Because of the alternate plant areas proximity to the sensitive receptors located south-west and north-west of the main project area, it's recommended that the processing and beneficiation plant be located the preferred area shown in Error! Reference source not found..

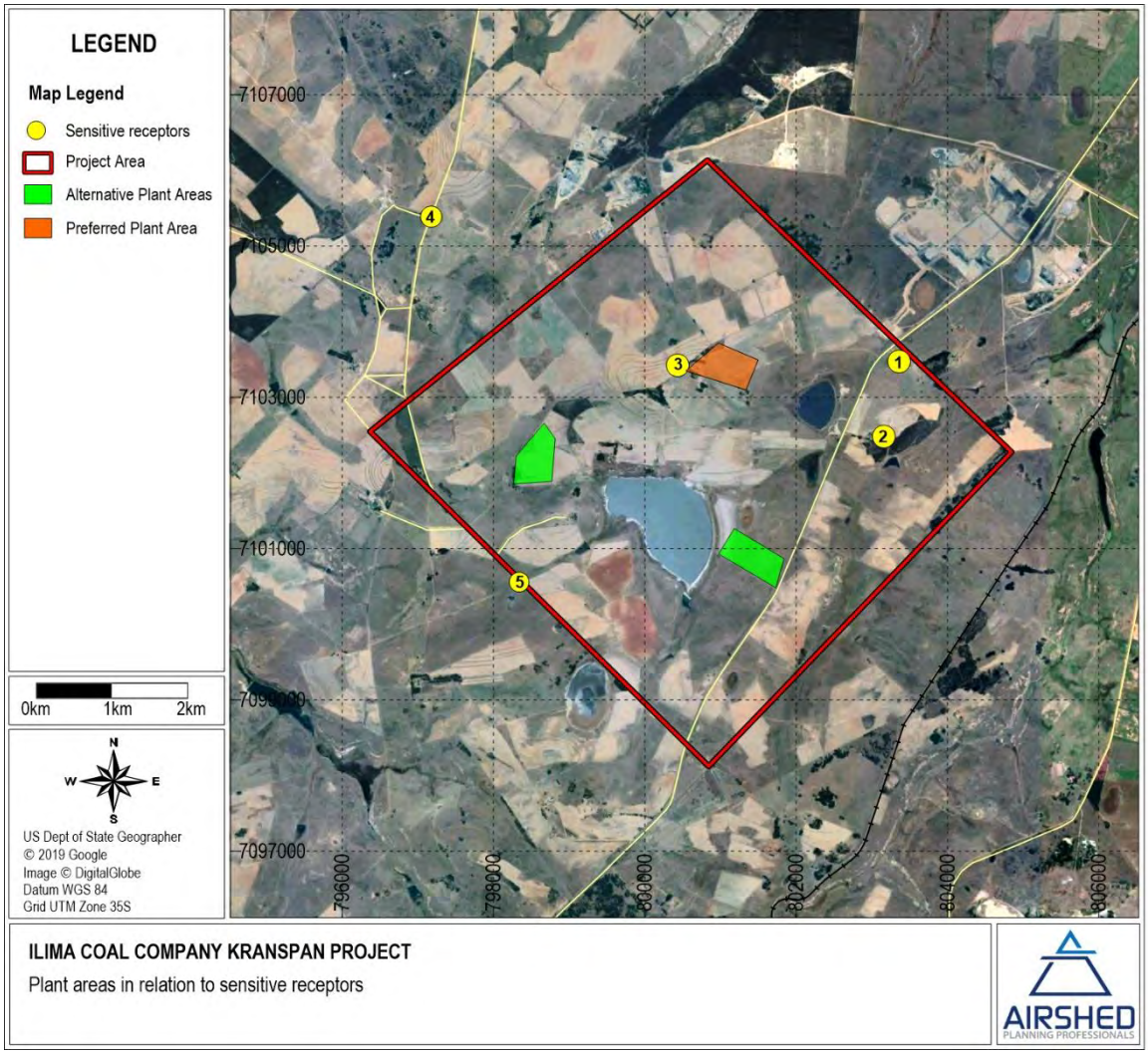


Figure 14: Plant areas in relation to existing Sensitive Receptors

5.2.3 Screening

If noise control at the source and the use of distance between source and receiver is not possible, screening methods must be considered. The effectiveness of a noise barrier is dependent on its length, effective height, and position relative to the source and receiver as well as material of construction. To optimize the effect of screening, screens should be located close to either the source of the noise, or the receiver.

The careful placement of barriers such as screens or berms can significantly reduce noise impacts but may result in additional visual impacts. Although vegetation such as shrubs or trees may improve the visual impact of construction sites, it will not significantly reduce noise impacts and should not be considered as a control measure.

Earth berms can be built to provide screening for large scale earth moving operations and can be landscaped to become permanent features once construction is completed. Care should be taken when constructing earth berms since it may become a significant source of dust.

5.3 Monitoring

Noise monitoring at sites where noise is or may become an issue is essential. Noise sampling at KN 1 and KN 5 should be incorporated in an annual environmental noise monitoring programme. If KN 2 and KN3 are continued to be used for residential purposes by Ilima they should be included in the monitoring programme.

Also, in the event that noise related complaints are received short term (24-hour) ambient noise measurements should be conducted as part of investigating the complaints. The results of the measurements should be used to inform any follow up interventions. The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.

The following procedure should be adopted for all noise surveys:

- Any surveys should be designed and conducted by a trained specialist.
- Sampling should be carried out using a Type 1 SLM that meets all appropriate IEC standards and is subject to annual calibration by an accredited laboratory.
- The acoustic sensitivity of the SLM should be tested with a portable acoustic calibrator before and after each sampling session.
- Samples of 10 min to 24 hours in duration and sufficient for statistical analysis should be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples representative of the day- and night-time acoustic environment should be taken.
- The following acoustic indices should be recoded and reported: L_{Aeq} (T), statistical noise level $L_{A90,}$ L_{AFmin} and $L_{AFmax,}$ octave band or 3rd octave band frequency spectra.
- The SLM should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface.
- Efforts should be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the ground is wet.
- A detailed log and record should be kept. Records should include site details, weather conditions during sampling and observations made regarding the acoustic environment of each site.

The investigation of complaints should include an investigation into equipment or machinery that likely result or resulted in noise levels annoying to the community. This could be achieved with source noise measurements.

5.4 Summary of Noise Management Plan

The targets for the noise management plan are provided in Table 10 with actions provided in Table 11.

Table 10: Noise Management Plan for the proposed project operations

No.	Mitigation Measures	Phase	Timeframe	Responsible party for implementation	Monitoring Party (frequency)	Target	Performance Indicators (Monitoring Tool)
A	Various management measures may be implemented including: controlling noise at source, controlling spread of noise, controlling noise at receiver. *It is recommended that equipment be selected with lowest noise specifications and where possible to enclose noisy equipment.*	Operational Phase	Duration of operations	Applicant Environmental Manager	Environmental Manager (annually or when complaints are received)	IFC residential guidelines (55 dBA for day-time conditions and 45 dBA for night-time conditions)	Sampled noise levels are within IFC residential guidelines at the closest noise sensitive receptors.
Noise Sampling							
B	Noise sampling be conducted at KN 1 and KN 5 annually. Additionally, also at KN 2, KN 3 if Ilima continue to use the farmsteads as residences.	Construction, operation and closure phases	10 to 30 minute sample during the day and night. Sampling should be conducted annually during construction, operations and closure	Applicant Environmental Manager	Environmental Manager	Ensure compliance with IFC residential guidelines (55 dBA for day-time conditions and 45 dBA for night-time conditions)	Type 1 SLM
C	Noise sampling be conducted at NSR in the event of a complaint.	Planning phase and proposed operational phase.	24-hour sample	Applicant Environmental Manager	Environmental Manager	Ensure compliance with IFC residential guidelines (55 dBA for day-time conditions and 45 dBA for night-time conditions)	Type 1 SLM

Table 11: Action Plan

Phase	Management Action	Timeframe for Implementation	Responsible Party for Implementation	Responsible Party for Monitoring/Audit/Review
Construction Phase	Undertake a day and night time sample at KN 1 and KN 5 or undertake noise sampling at NSRs in the event of a complaint. If Ilima continue to use the homesteads at KN 2 and KN 3 as residences these should be included.	Annual sampling at KN 1 and KN 5 or when a complaint is received (if the homesteads at KN 2 and KN 3 are continued to be used as residences, these should be included).	Consultant	Consultant Environmental Manager (internal review)
Operational Phase	Undertake a day and night time sample at KN 1 and KN 5 or undertake noise sampling at NSRs in the event of a complaint. If Ilima continue to use the homesteads at KN 2 and KN 3 as residences these should be included.	Annual sampling at KN 1 and KN 5 or when a complaint is received (if the homesteads at KN 2 and KN 3 are continued to be used as residences, these should be included).	Consultant	Consultant Environmental Manager (internal review)
	Maintenance on equipment	Throughout operation	Environmental Manager	Environmental Manager (onsite monitoring)
Closure Phase	Undertake a day and night time sample at KN 1 and KN 5 or undertake noise sampling at NSRs in the event of a complaint. If Ilima continue to use the homesteads at KN 2 and KN 3 as residences these should be included.	Annual sampling at KN 1 and KN 5 or when a complaint is received (if the homesteads at KN 2 and KN 3 are continued to be used as residences, these should be included).	Consultant	Consultant Environmental Manager (internal review)

6 Impact Assessment

The significance of environmental noise impacts was assessed according to the methodology adopted by ABS Africa Refer to Appendix E of this report for the methodology.

The significance of the noise impacts due to project activities were found to be *low to medium* during the construction and closure phases and *medium to high* during the operational phase (Table 12). Assuming the adoption of good practice noise mitigation and management measures as recommended, the significance of project noise impacts may be reduced to *low to medium during all project phases* (Table 12).

Table 12: Significance rating for noise impacts due to project activities

Project Activity	Noise Impacts		Likelihood		Consequence			
Construction phase	Phase of Project	Construction Phase	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	Significance Rating
	Impact Classification	Direct Impact	Significance Pre-Mitigation					
	Resulting Impact from Activity	Elevated Noise Levels	4	4	3	3	3	72
			Significance Post- Mitigation					
			4	3	3	2	3	56

Project Activity	Noise Impacts		Likelihood		Consequence			
Operational phase	Phase of Project	Operational Phase	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	Significance Rating
	Impact Classification	Direct Impact	Significance Pre-Mitigation					
	Resulting Impact from Activity	Elevated Noise Levels	4	4	3	3	4	80
			Significance Post- Mitigation					
			4	3	3	2	4	63

Project Activity	Noise Impacts		Likelihood		Consequence			
Closure phase	Phase of Project	Closure phase	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	Significance Rating
	Impact Classification	Direct Impact	Significance Pre-Mitigation					
	Resulting Impact from Activity	Elevated Noise Levels	4	4	3	3	3	72
			Significance Post- Mitigation					
			4	3	3	2	3	56

7 Conclusion

Based on the findings of the assessment and provided the measures planned and recommended are in place, it is the specialist opinion that the project may be authorised.

8 References

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Appendix A – Sound Level Meter Calibration Certificates

nmisa
National Metrology Institute of South Africa

Private Bag X34, Lynnwood Ridge, Pretoria, 0040
CSIR Campus, Meiring Naude Road, Brummeria, 0184
Calibration office: +27 12 841 4623
Reception: +27 12 841 4152
Fax: +27 12 841 4458
E-mail enquiries: info@nmisa.org

Certificate of Conformance

Calibration of:	SOUND LEVEL METER, OCTAVE BAND FILTER, THIRD OCTAVE BAND FILTER & MICROPHONE
Manufacturer:	BRÜEL & KJÆR
Model number:	2250-L, 4950
Serial number:	2731851, 2709293
Calibrated for:	AIRSHED PLANNING PROFESSIONALS (PTY) LTD Midrand
Calibration procedure:	AVIAS-0007 AVIAS-0010
Period of calibration:	10 – 11 May 2017

1 PROCEDURE

The sound level meter was electrically calibrated according to the relevant clauses of SANS 656 and 658 specifications. The microphone with the sound level meter was acoustically calibrated according to the relevant clauses of SANS 656 specifications. The instrument complete with filters was electrically calibrated according to IEC 61260 specification.

The results of the measurements are traceable to the national measurement standards.

The following equipment was used:

Brüel & Kjær 4226 Multi-function calibrator	(AS-52)
Inline Capacitor	(AS-98)
Madgetech PRHTemp 2000	(AS-106)
Brüel & Kjær 3630 Calibration platform	(AS-109)

Calibrated by **R Nel** **Metrologist (Technical Signatory)**	Checked by **H Potgieter** **Metrologist**	For Chief Executive Officer
Date of Issue **11 May 2017**	**Page 1 of 3**	Certificate number **AVIAS-4634**

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2 RESULTS

2.1 The following parameters of the sound level meter were calibrated and conformed to the SANS 656 and SANS 658 specifications, type 1:

Indication under reference conditions (SANS 656 clause 11.2)		U = 0,20 dB
Electrical self generated noise		
A-weighted	(12,9 dB)	U = 0,30 dB
C-weighted	(13,7 dB)	U = 0,30 dB
Linear	(19,2 dB)	U = 0,30 dB
Linearity range (primary indicator range) (SANS clause 9.9, table 11)		
1 kHz		U = 0,12 dB
4 kHz		U = 0,12 dB
8 kHz		U = 0,12 dB
Frequency Weightings (SANS 656 clauses 8.1, 11.2, tables 4 & 5)		
A-weighting	(25 Hz – 16 kHz)	U = 0,12 dB
C-weighting	(25 Hz – 16 kHz)	U = 0,12 dB
Linear	(25 Hz – 16 kHz)	U = 0,12 dB
Time weightings (SANS 656 clauses 9.2, 9.3, 9.5, 11.4, table 9, 7 & 10)		
Slow and Fast		U = 0,11 dB
Impulse		U = 0,11 dB
Peak		U = 0,09 dB
Time averaging, L_{Aeq} (SANS 658 clause 11.3.3, table 4)		U = 0,12 dB
Impulse weighted time averaging, L_{Aleq} (SANS 658 Annex C, table C1)		U = 0,12 dB
Overload indication (SANS 656 clause 11.3)		U = 0,31 dB

2.2 The following parameter of the microphone with the sound level meter were calibrated and conformed to the SANS 656 specifications, type 1:

Frequency response (SANS 656 clauses 8.1, tables 4 & 5)	
31,5 Hz – 12,5 kHz	U = 0,20 dB @ 1 kHz

Calibrated by **R Nel** **Metrologist (Technical Signatory)**	Checked by **H Potgieter** **Metrologist**	For Chief Executive Officer
Date of Issue **11 May 2017**	**Page 2 of 3**	Certificate number **AVVAS-4634**

2.3 The following parameter of the octave band filter was calibrated and conformed to the IEC 61260 specification, class 0 base 2:

Relative attenuation — $U = 0{,}10$ dB @ f_m
(IEC 61260 clause 4.4, 5.3)
16 Hz - 8 kHz

2.4 The following parameter of the third octave band filter was calibrated and conformed to the IEC 61260 specification, class 0 base 2:

Relative attenuation — $U = 0{,}10$ dB @ f_m
(IEC 61260 clause 4.4, 5.3)
12,5 Hz - 16 kHz

3 REMARKS

3.1 The reported uncertainties of measurement were calculated and expressed in accordance with the BIPM, IEC, ISO, IUPAP, OIML document entitled "A Guide to the Expression of Uncertainty in Measurement" (International Organisation for Standardisation, Geneva, Switzerland, 1993).

3.2 The reported expanded uncertainty of measurement, U, is stated as the standard uncertainty of measurement multiplied by a coverage factor of $k = 2$, which for a normal distribution approximates a level of confidence of 95,45 %. The reported expanded uncertainty of measurements is at the reference points.

3.3 Certain of the NMISA certificates are consistent with the capabilities that are included in appendix C of the MRA (Mutual Recognition Arrangement) drawn up by the CIPM. Under the MRA, all participating institutes recognise the validity of each other's calibration and measurement certificates for the quantities and ranges and measurement uncertainties specified in Appendix C. For details see http://www.bipm.org.

3.4 The calibrations were carried out at an ambient temperature of 23 °C ± 2 °C and a relative humidity of 50 %RH ± 20 %RH.

3.5 Only parameters given in 2.1, 2.2, 2.3 and 2.4 were calibrated.

3.6 The above statement of conformance is based on the measurement value(s) obtained, extended by the estimated uncertainty of measurement, being within the appropriate specification limit(s).

3.7 The firmware versions of the sound measuring device at the time of calibration were: BZ7130 V4.4; BZ7131 V4.4; BZ7132 V4.4.

---------- *end of certificate* ----------

Calibrated by	Checked by	For Chief Executive Officer
R Nel **Metrologist (Technical Signatory)**	**H Potgieter** **Metrologist**	
Date of Issue		Certificate number
11 May 2017	**Page 3 of 3**	**AVIAS-4634**

nmisa
National Metrology Institute of South Africa

Certificate of Conformance

Private Bag X34, Lynnwood Ridge, Pretoria, 0040
CSIR Campus, Meiring Naude Road, Brummeria, 0184
Calibration office: +27 12 841 4623
Reception: +27 12 841 4152
Fax: +27 12 841 4458
E-mail enquiries: info@nmisa.org

Calibration of:	SOUND CALIBRATOR
Manufacturer:	SVANTEK
Model number:	SV33
Serial number:	43170
Calibrated for:	AIRSHED PLANNING PROFESSIONALS (PTY) LTD Midrand
Calibration procedure:	AV\AS-0008
Period of calibration:	29 May 2018

1 PROCEDURE

The sound calibrator was calibrated according to IEC 60942: 2003 specification.

The results of the measurements are traceable to the national measurement standards.

The following equipment was used:

Brüel & Kjær 2673 preamplifier	(AS-146)
MadgeTech PRHTemp2000	(AS-106)
Brüel & Kjær 3630 Calibration platform	(AS-109)
Brüel & Kjær 4228 Pistonphone	(AS-WSTD-13)
Brüel & Kjær 4192 Pressure Microphone	(AS-WSTD-15)

Calibrated by **R Nel** **Metrologist (Technical Signatory)**	Checked by **H Potgieter** **Metrologist**	For Chief Executive Officer
Date of issue **29 May 2018**	**Page 1 of 2**	Certificate number **AV\AS-4723**

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2 RESULTS

2.1 The following parameters of the sound calibrator were calibrated and conformed to IEC 60942: 2003 specification, class 1:

Frequency (IEC 60942 clause B.3.5) 1 000 Hz	$U = 0{,}10$ Hz
Sound Pressure Level (IEC 60942 clause B.3.4) 114 dB	$U = 0{,}15$ dB
Total Distortion (IEC 60942 clause B.3.6)	$U = 0{,}13$ %

3 REMARKS

3.1 The reported uncertainties of measurement were calculated and expressed in accordance with the BIPM, IEC, ISO, IUPAP, OIML document entitled "A Guide to the Expression of Uncertainty in Measurement" (International Organisation for Standardisation, Geneva, Switzerland, 1993).

3.2 The reported expanded uncertainty of measurement, U, is stated as the standard uncertainty of measurement multiplied by a coverage factor of $k = 2$, which for a normal distribution approximates a level of confidence of 95,45 %.

3.3 Certain of the NMISA certificates are consistent with the capabilities that are included in appendix C of the MRA (Mutual Recognition Arrangement) drawn up by the CIPM. Under the MRA, all participating institutes recognise the validity of each other's calibration and measurement certificates for the quantities and ranges and measurement uncertainties specified in Appendix C. For details see http://www.bipm.org.

3.4 The calibrations were carried out at an ambient temperature of 23 °C ± 2 °C and a relative humidity of 50 %RH ± 20 %RH.

3.5 The above statement of conformance is based on the measurement value(s) obtained, extended by the estimated uncertainty of measurement, being within the appropriate specification limit(s).

---------- *end of certificate* ----------

Calibrated by **R Nel** **Metrologist (Technical Signatory)**	Checked by **H Potgieter** **Metrologist**	For Chief Executive Officer
Date of Issue **29 May 2018**	**Page 2 of 2**	Certificate number **AV\AS-4723**

Appendix B – Specialist Curriculum Vitae

FULL CURRICULUM VITAE

Name of Firm	Airshed Planning Professionals (Pty) Ltd
Name of Staff	André Bruwer
Profession	Air Quality Consultant
Date of Birth	8 December 1984
Years with Firm	6 years
Nationalities	South African

KEY QUALIFICATIONS

For the past 5 years he have been working part time at Airshed Planning Professionals as Laboratory- and Field Technician. The laboratory work entailed processing dust fallout samples, moisture content and particle analysis. The field work consisted of a wide variety of jobs such as installing dust fallout buckets, setting up and maintaining of PM 10 monitors, recording noise measurements and writing up the required notes made during these trips.

He is also finished a Master's degree in Environmental Engineering specialising in air quality, during which dispersion modelling was used to investigate the impact of biogenic Nitrogen on Sulphur and Nitrogen deposition on the South African Highveld. This required that he learn how to operate EPA Regulatory puff based model CALPUFF and the accompanied program suite.

Currently he is appointed as a Junior Air Quality Consultant at Airshed Planning Professionals.

EDUCATION

BEng (Chemical Engineering), 2009, University of Pretoria

BEng (Hons) (Environmental Engineering), 2011, University of Pretoria

MEng (Environmental Engineering), 2017, University of Pretoria

Other Certificates

Photographic Workshop University of Pretoria Archives, 2007, University of Pretoria

COUNTRIES OF WORK EXPERIENCE

South Africa, Angola.

EMPLOYMENT RECORD

April 2017 - Present

Airshed Planning Professionals (Pty) Ltd, Junior Air Quality Consultant, Midrand, South Africa.

2011 - 2016

Airshed Planning Professionals (Pty) Ltd, Laboratory and Field Technician, Midrand, South Africa.

December 2005 – January 2006

Sasol Nitro, Vacation Work, Secunda, South Africa.

December 2006 – January 2007

Sasol Polymers, Vacation Work, Secunda, South Africa.

December 2007 – January 2008

Sasol Polymers, Vacation Work, Secunda, South Africa.

LANGUAGES

	Speak	Read	Write
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

Signature of staff member	Date (Day / Month / Year)
	18/05/2017
Full name of staff member:	Adamus Paulus Bruwer

3

SITE NUMBER:	KN 1		SLM DATA RECORD:	krans001
Longitude/Easting: 30.033116		Latitude/Northing: -26.154954		Elevation:
Short Location Description & Notes:				

SETUP	Start Date & Time: 12:52:10	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	1.5 - 2	NW	20.9	57.7	89%	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☑ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other

Description: Close to R36. Very busy road. Mine across road (Vorkeerdepan)

EVENTS

Time	Description	Time	Description	Time	Description	Time	Description
12:52	Car x 5	13:03	Car	13:14	Gate		
12:53	Truck	13:05	Car	13:15	Car x 3		
12:54	Truck x 1	13:06	Truck	13:16	Car		
	Car 5	13:07	Car x 3		Car		
12:55	Car x 2	13:08	Truck	13:17	Truck		
	Truck	13:08	Car		Car x 2		
12:56	Car	13:09	Truck		Truck		
	Truck x 2		Car x 3		Car x 2		
12:59	Truck	13:10	Car x 3	13:18	Car		
	Car x 2	13:11	Car		Car		
13:00	Sneeze		Truck		Truck		
	Truck x 2	13:12	Car x 3	13:19	Car		
	Car	13:13	Taxi + kids + door		Truck		
13:02	Truck	13:14	Truck		Car x 2		

Car

Page __ of __

SITE NUMBER: KNE1 Night		SLM DATA RECORD: Nors 006
Longitude/Easting:	Latitude/Northing:	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 23:35:28	End Date & Time:	Sensitivity Before:	Sensitivity After:

15 Min

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	0 - 1	N	18.3	71.6	0	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☑ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other
Description: Activity from the Verkeerde pan vlei mine									

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description
23:37	Car						
23:38	Truck						
23:39	Truck						
23:46	Car						

Page __ of __

SITE NUMBER: KM2		SLM DATA RECORD: Kranspan002
Longitude/Easting: 30.030157	Latitude/Northing: -26.165818	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 13:36:33	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	0.5 - 1	W	24	43	80%	
Middle						
End						

NOISE CLIMATE	☒ Birds	☐ Insects	☑ Dogs	☐ Music	☐ Community	☒ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other

Description: Close to R36. Very busy. Close to house. Tall trees, long grass, grinding in background (from house) Power transformer ± 15m NW, power cables, metal fences

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description
13:36	Truck (R36)						
13:38	Plane						
13:50	Car						
13:52	Dog						

Page __ of __

SITE NUMBER: KN2 Night			SLM DATA RECORD: Kranso08	
Longitude/Easting:		Latitude/Northing:		Elevation:
Short Location Description & Notes:				

SETUP	Start Date & Time: 00:29:50	End Date & Time:	Sensitivity Before:	Sensitivity After:
	5min.			

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	0 - 1	N	17	75	0	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☐ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other
Description: Activity from Uerkeerdepan mine. Road traffic. Misty									

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description

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SITE NUMBER: KN3			**SLM DATA RECORD:** KRANS003
lat **~~Longitude/Easting:~~** ~~-2678~~ -26,157494		**~~Latitude/Northing:~~** ~~29,984424~~ 30.008979	**Elevation:**
Short Location Description & Notes:			

SETUP	**Start Date & Time:** 14:09:55	**End Date & Time:**	**Sensitivity Before:**	**Sensitivity After:**

METEOROLOGY	**Wind Speed (m/s)**	**Wind Direction (°)**	**Temperature (°C)**	**Humidity (%)**	**Clouds (%)**	**Remarks:**
Start	2-3	W	23	47	70	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☑ Dogs	☐ Music	☐ Community	☑ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other
Description: Sheep, long trees, long mielies, short grass, wire fence									

EVENTS							
Time	**Description**	**Time**	**Description**	**Time**	**Description**	**Time**	**Description**
14:11	Operator slipped						

SITE NUMBER: KN3 Night		SLM DATA RECORD: krans007
Longitude/Easting:	Latitude/Northing:	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 00:01:27	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	0 - 0.5	N	14	66	0	
Middle						
End						

NOISE CLIMATE	☑ Birds	☐ Insects	☑ Dogs	☐ Music	☐ Community	☐ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other

Description: Mining activity from Verkeerde Vlei mine

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description

Page __ of __

SITE NUMBER: KN54		SLM DATA RECORD: KRANS 005
Longitude/Easting: 29.971916	Latitude/Northing: -26,140449	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 15:32:05	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	1-2	W	26	46	60	
Middle						
End						

NOISE CLIMATE	☐ Birds	☑ Insects	☑ Dogs	☐ Music	☐ Community	☑ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other

Description: Cows, trees, long grass, wire fence.

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description
15:34:35	Cow						
15:37	Car						

SITE NUMBER: KN4 Night		SLM DATA RECORD: Kranspo10
Longitude/Easting:	Latitude/Northing:	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 01:30:27	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	0-1	N	17	73	0	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☐ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other
Description: Activity from Verkeerdepan Mine. frogs. Misty/foggy									

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description

SITE NUMBER: KNS			**SLM DATA RECORD:** Krans 004
lat **~~Longitude/Easting:~~** -26.183144	long	**~~Latitude/Northing:~~** 29.984427	**Elevation:**
Short Location Description & Notes:			

SETUP	**Start Date & Time:** 14:54:05	**End Date & Time:**	**Sensitivity Before:**	**Sensitivity After:**
	20 min.			

METEOROLOGY	**Wind Speed (m/s)**	**Wind Direction (°)**	**Temperature (°C)**	**Humidity (%)**	**Clouds (%)**	**Remarks:**
Start	1-2	W	26	39	60	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☑ Air Traffic	☐ Road Traffic	☐ Constr.	☐ Other
Description: long grass, wire fence,									

EVENTS							
Time	**Description**	**Time**	**Description**	**Time**	**Description**	**Time**	**Description**
15:04	Car						
15:12	Blasting (mine)						

Page __ of __

SITE NUMBER: KN5 Night		SLM DATA RECORD: KTAN5 009
Longitude/Easting:	Latitude/Northing:	Elevation:
Short Location Description & Notes:		

SETUP	Start Date & Time: 01.01.29	End Date & Time:	Sensitivity Before:	Sensitivity After:

METEOROLOGY	Wind Speed (m/s)	Wind Direction (°)	Temperature (°C)	Humidity (%)	Clouds (%)	Remarks:
Start	—	—	16.5	70	0	
Middle						
End						

NOISE CLIMATE	☑ Birds	☑ Insects	☐ Dogs	☐ Music	☐ Community	☐ Air Traffic	☑ Road Traffic	☐ Constr.	☐ Other
Description: Verkeerderspan Mine very far away / frogs, foggy / Misty									

EVENTS							
Time	Description	Time	Description	Time	Description	Time	Description

Facing North

Facing East

Facing South

Facing West

Figure 15: Photographs of environmental noise survey Site KN 1

Facing North

Facing East

Facing South

Facing West

Figure 16: Photographs of environmental noise survey Site KN 2

Facing North

Facing East

Facing South

Facing West

Figure 17: Photographs of environmental noise survey Site KN 3

Facing North

Facing East

Facing South

Facing West

Figure 18: Photographs of environmental noise survey Site KN 4

Facing North

Facing East

Facing South

Facing West

Figure 19: Photographs of environmental noise survey Site KN 5

Appendix D – Time-series, Statistical, and Frequency Spectrum Results

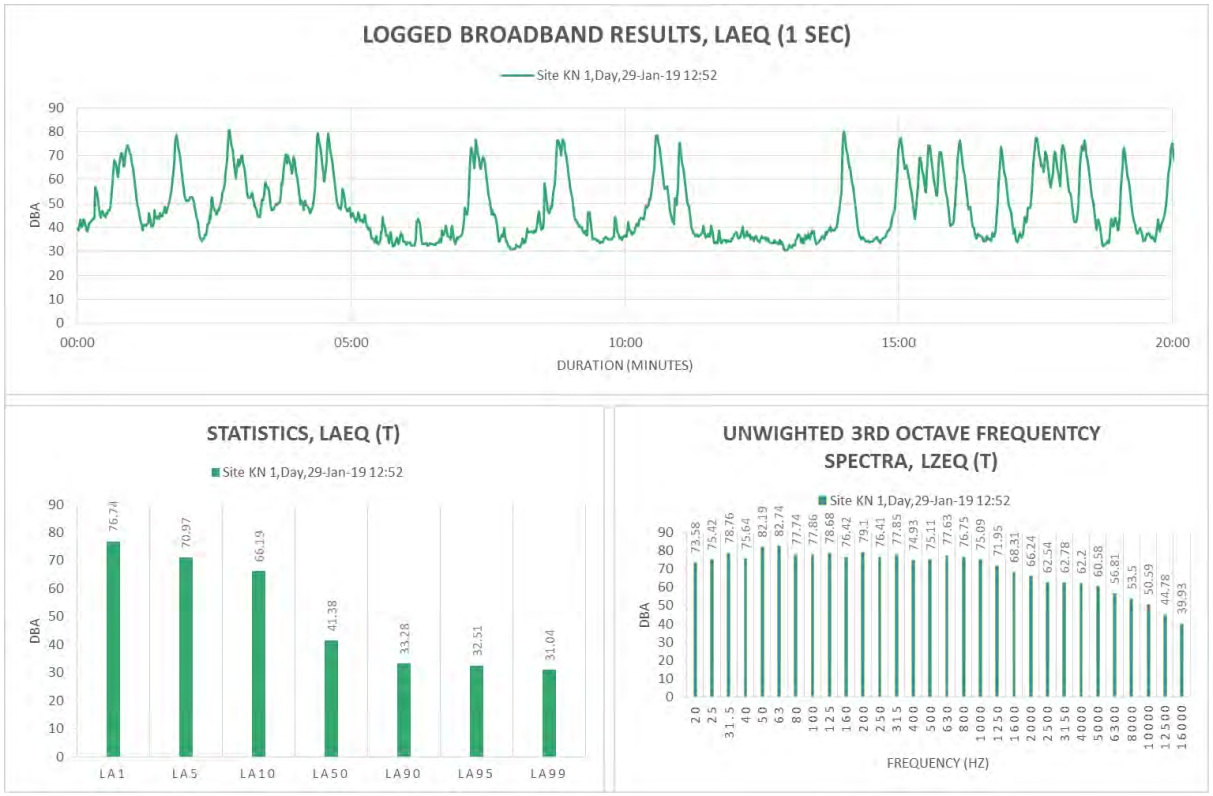

Figure 20: Detailed day-time survey results for Site KN 1

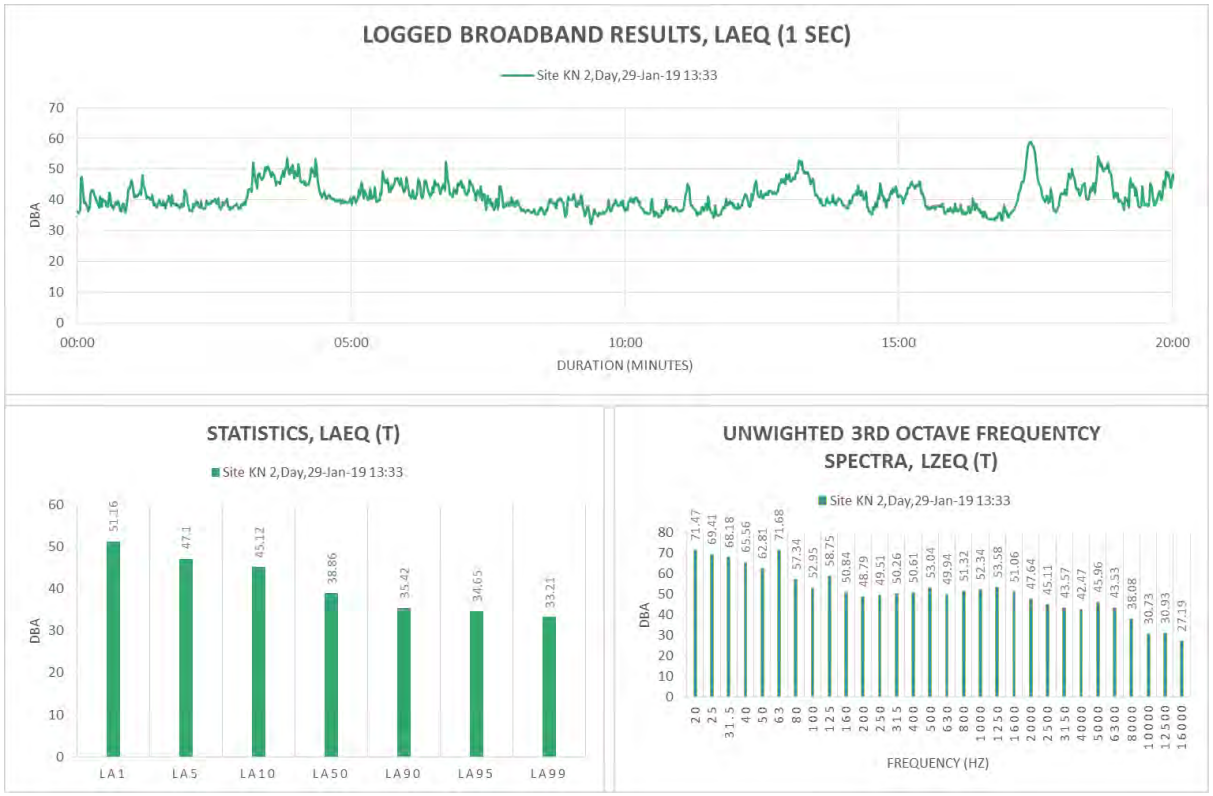

Figure 21: Detailed day-time survey results for Site KN 2

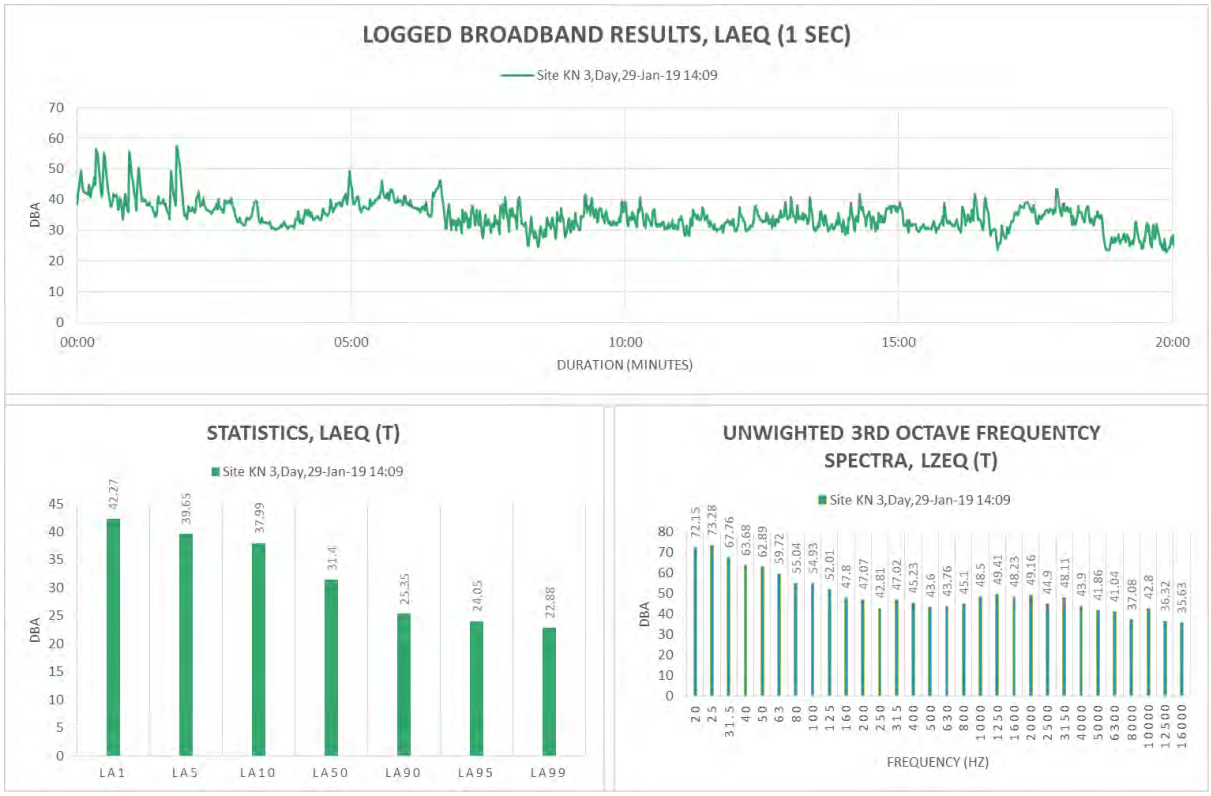

Figure 22: Detailed day-time survey results for Site KN 3

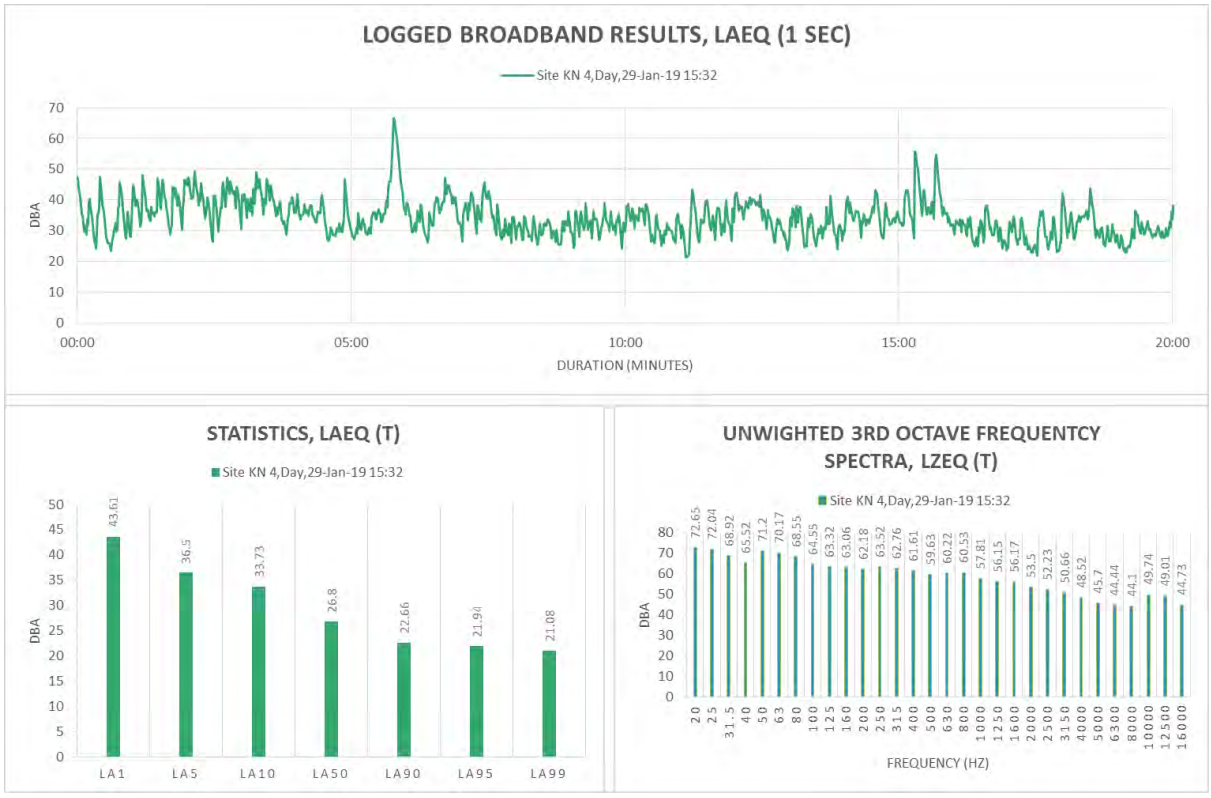

Figure 23: Detailed day-time survey results for Site KN 4

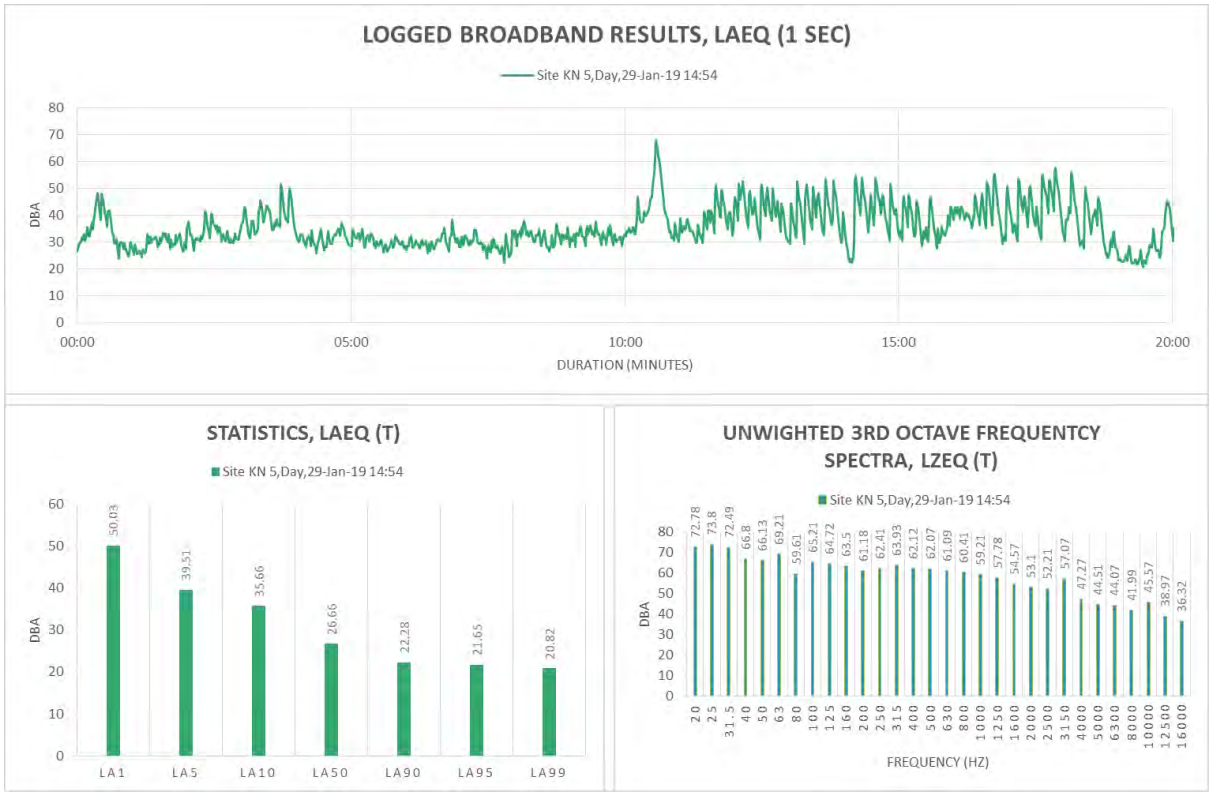

Figure 24: Detailed day-time survey results for Site KN 5

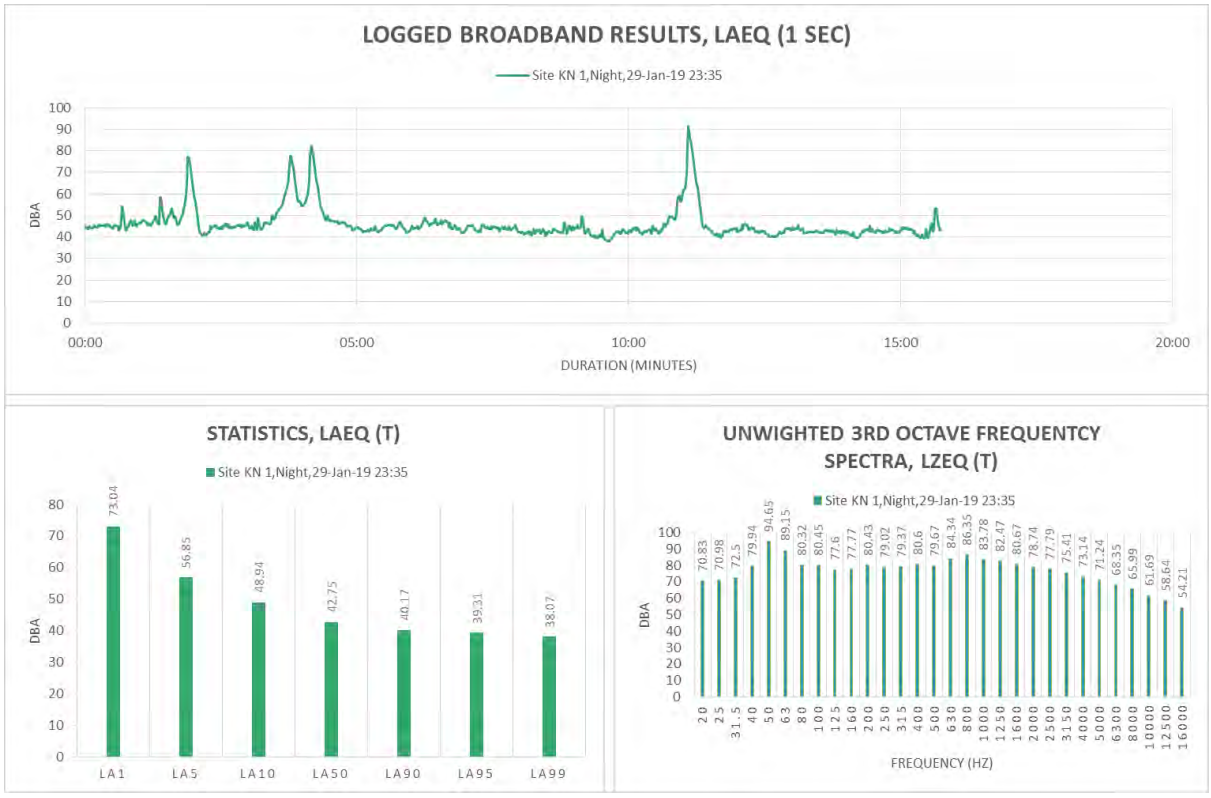

Figure 25: Detailed night-time survey results for Site KN 1

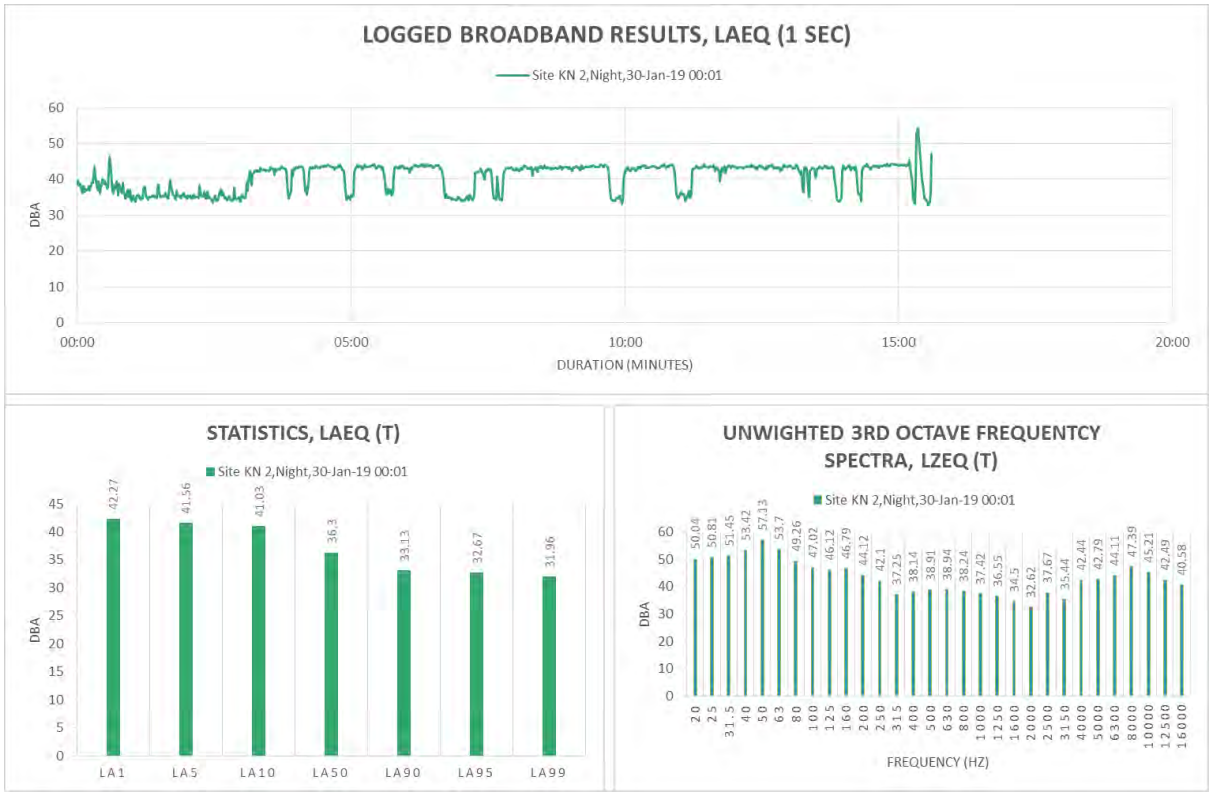

Figure 26: Detailed night -time survey results for Site KN 2

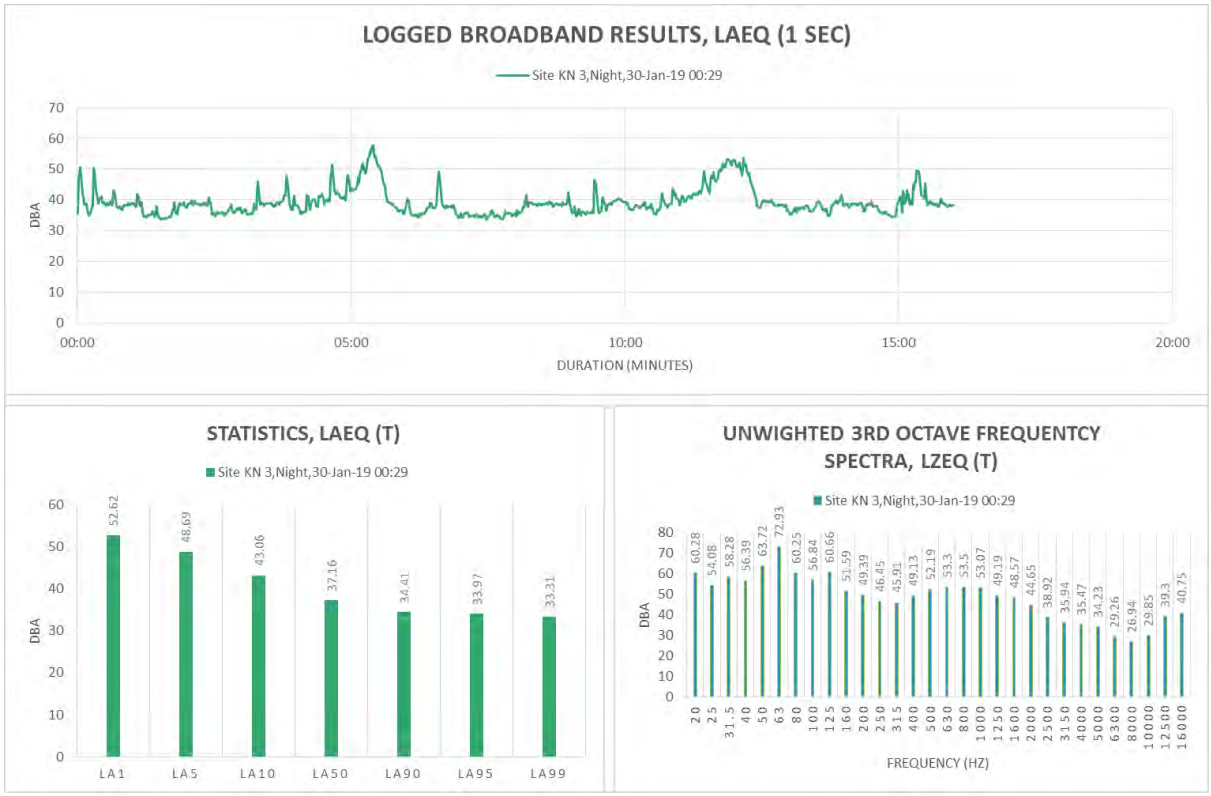

Figure 27: Detailed night -time survey results for Site KN 3

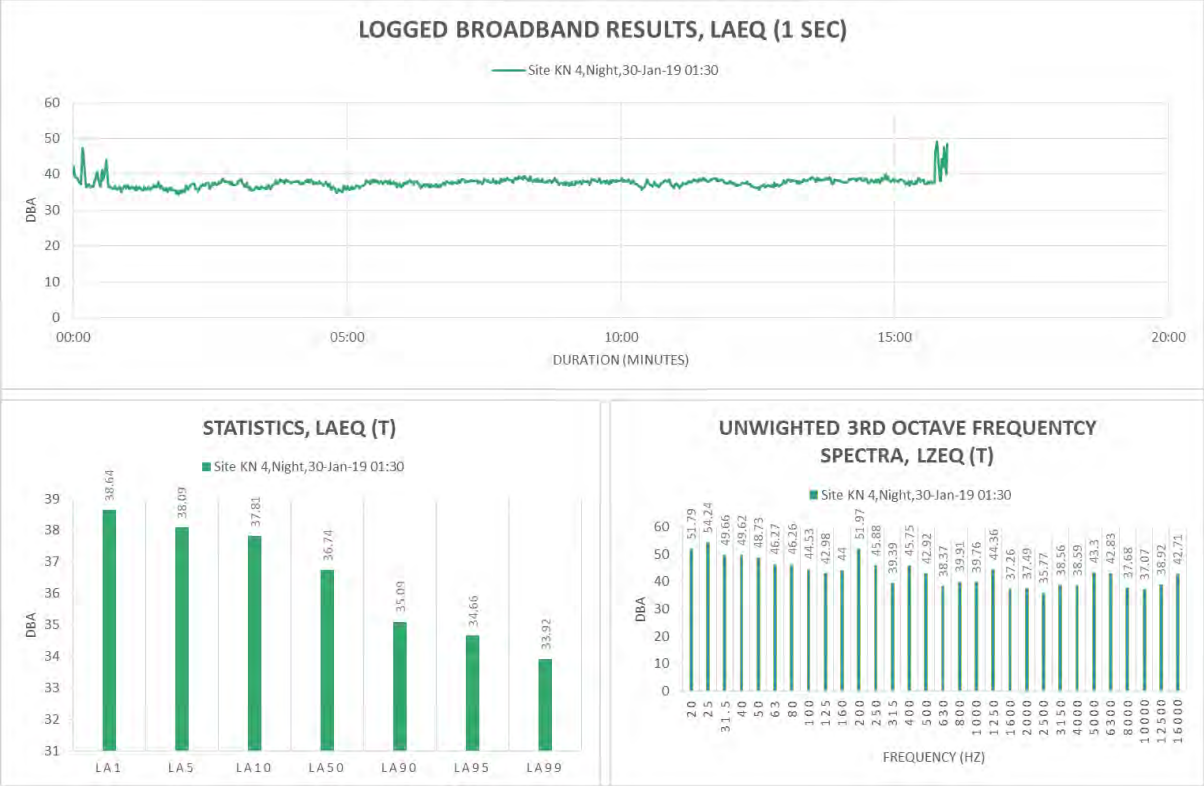

Figure 28: Detailed night -time survey results for Site KN 4

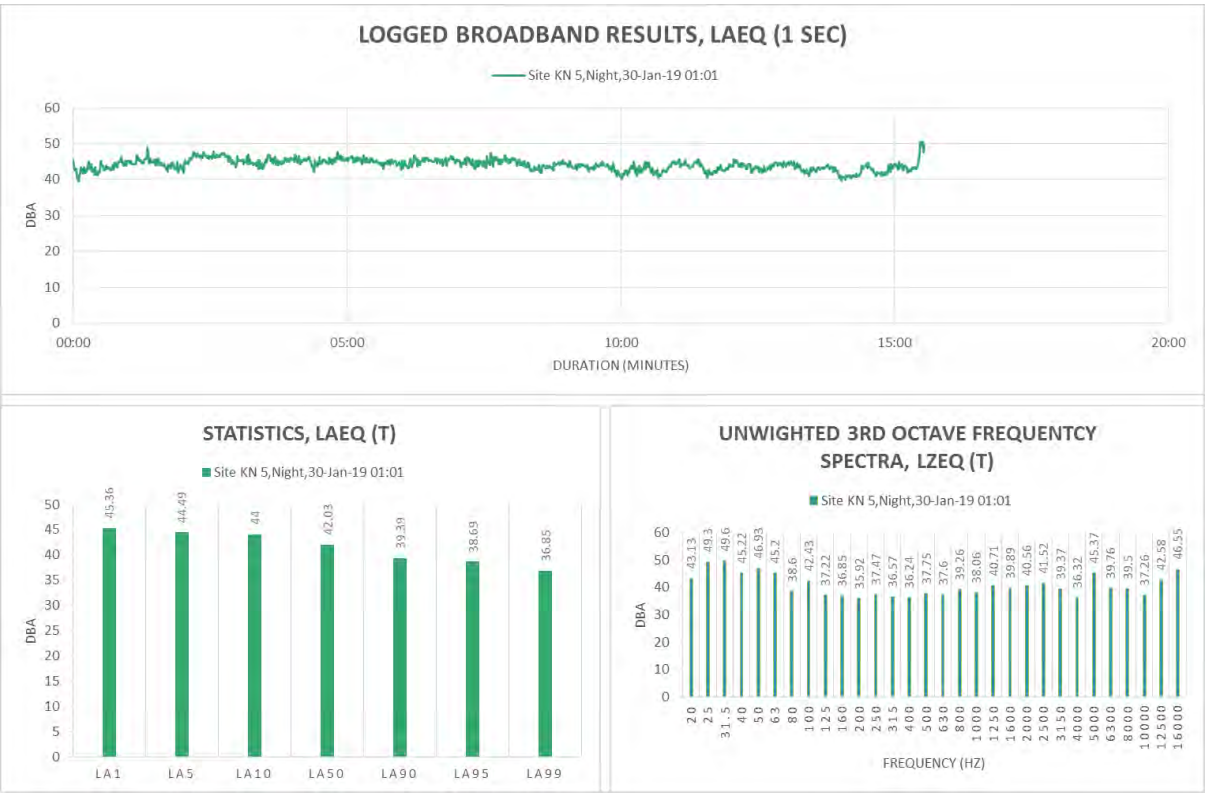

Figure 29: Detailed night -time survey results for Site KN 5

Appendix E – Significance Rating Methodology

Impact Significance Rating Methodology

The significance of the identified impact is assessed by rating each variable numerically, according to defined criteria as provided in Table B-1. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact.

The severity, spatial scope and duration of the impact together comprise the consequence of the impact; and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact and can obtain a maximum value of 10.

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table E-1 and Table E-2.

The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. Arguments for each specific impact assessment are presented in the text and encapsulated in the assessment summary table linked to each impact discussion.

Table E1: Criteria for assessing the significance of impacts

SEVERITY OF IMPACT	RATING
Insignificant/ non-harmful	1
Small/ potentially harmful	2
Significant/ slightly harmful	3
Great/ harmful	4
Disastrous/ extremely harmful	5
SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
Area specific	2
Whole project site/ local area	3
Regional	4
National/ International	5
DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure/ permanent	5
FREQUENCY OF ACTIVITY/ DURATION OF ASPECT	RATING

Annually or less/ low	1
6 monthly/ temporary	2
Monthly/ infrequent	3
Weekly/ life of operation/ regularly/ likely	4
Daily/ permanent/ high	5
FREQUENCY OF IMPACT	RATING
Almost never/ almost impossible	1
Very seldom/ highly unlikely	2
Infrequent/ unlikely/ seldom	3
Often/ regularly/ likely/ possible	4
Daily/ highly likely/ definitely	5

Table E2: Significance ratings matrix

CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Frequency of activity + frequency of impact)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table E3: Positive/negative mitigation ratings

Colour code	Significance Rating	Value	Negative impact management recommendation	Positive impact management recommendation
	Very high	126-150	Improve current management	Maintain current management
	High	101-125	Improve current management	Maintain current management
	Medium to high	76-100	Improve current management	Maintain current management
	Low to medium	51-75	Maintain current management	Improve current management
	Low	26-50	Maintain current management	Improve current management
	Very low	1-25	Maintain current management	Improve current management

Appendix F – Previous Kranspan Layout as Proposed on 20 November 2018

The site layout on which the dispersion modelling was based is shown below in Figure 30.

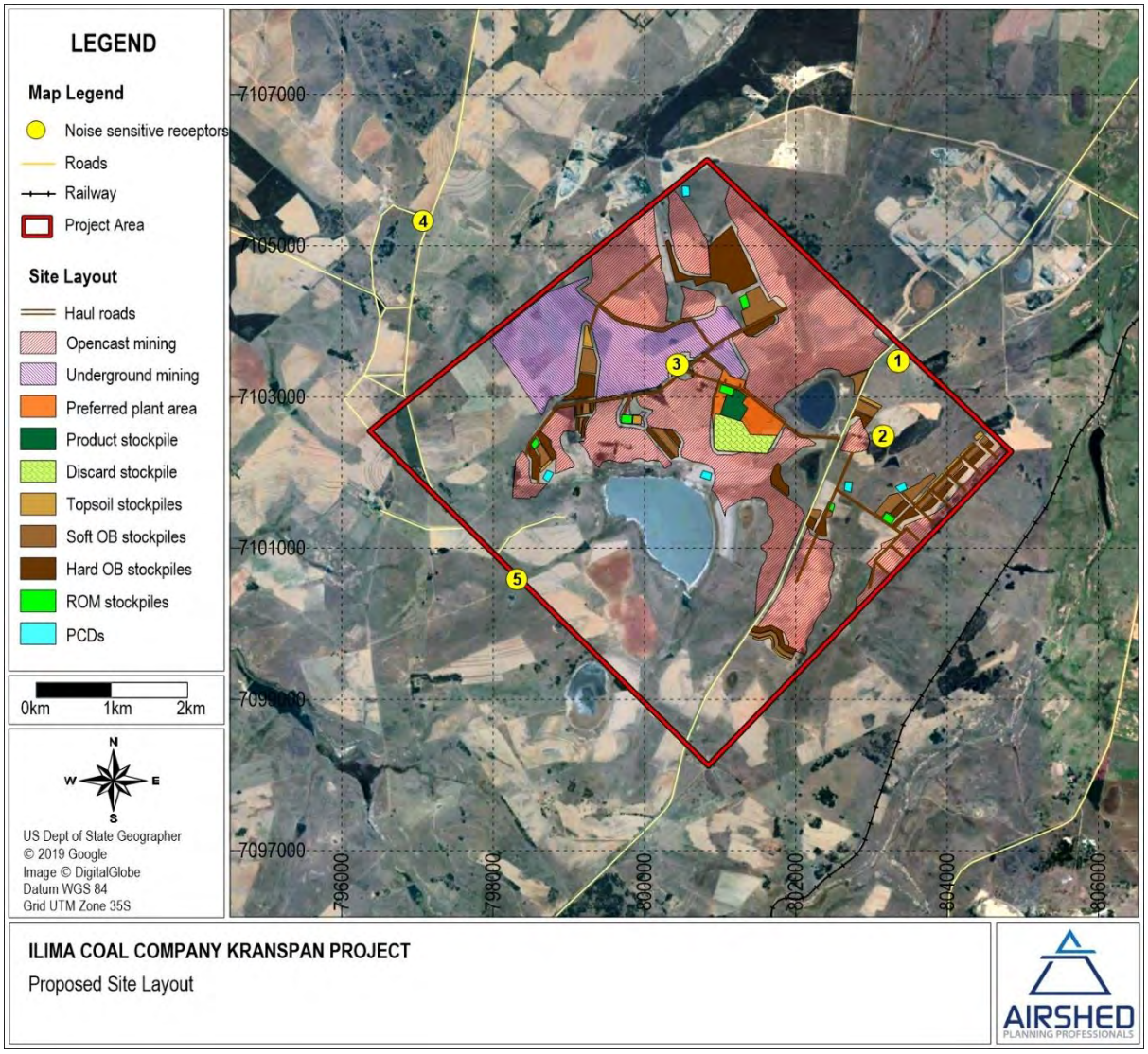

Figure 30: Previous site layout

Key differences to the layout which has most recently been proposed on 20 May 2019 (Figure 31) are:

The position of the plant area and co-disposal discard stockpile has changed from the centre of the mine area to position A indicated in Figure 31. New overburden facilities will be established at positions B and C (no-coal zones). The new plant layout is shown in Figure 32. The new position of the plant is closer to sensitive receptor 3 (see Figure 30) but further away from receptors 1 and 2. The noise impacts from plant activities are therefore likely to be higher at receptor 3 (farmstead) but will not be higher at receptors 1 and 2 than what was simulated in Section Error! Reference source not found.. However, since the mine has recently acquired the property at receptor 3 and the informal community will be relocated by the Msobo mine prior to construction at Kranspan, the conclusions that were reached based on noise dispersion modelling will not change.

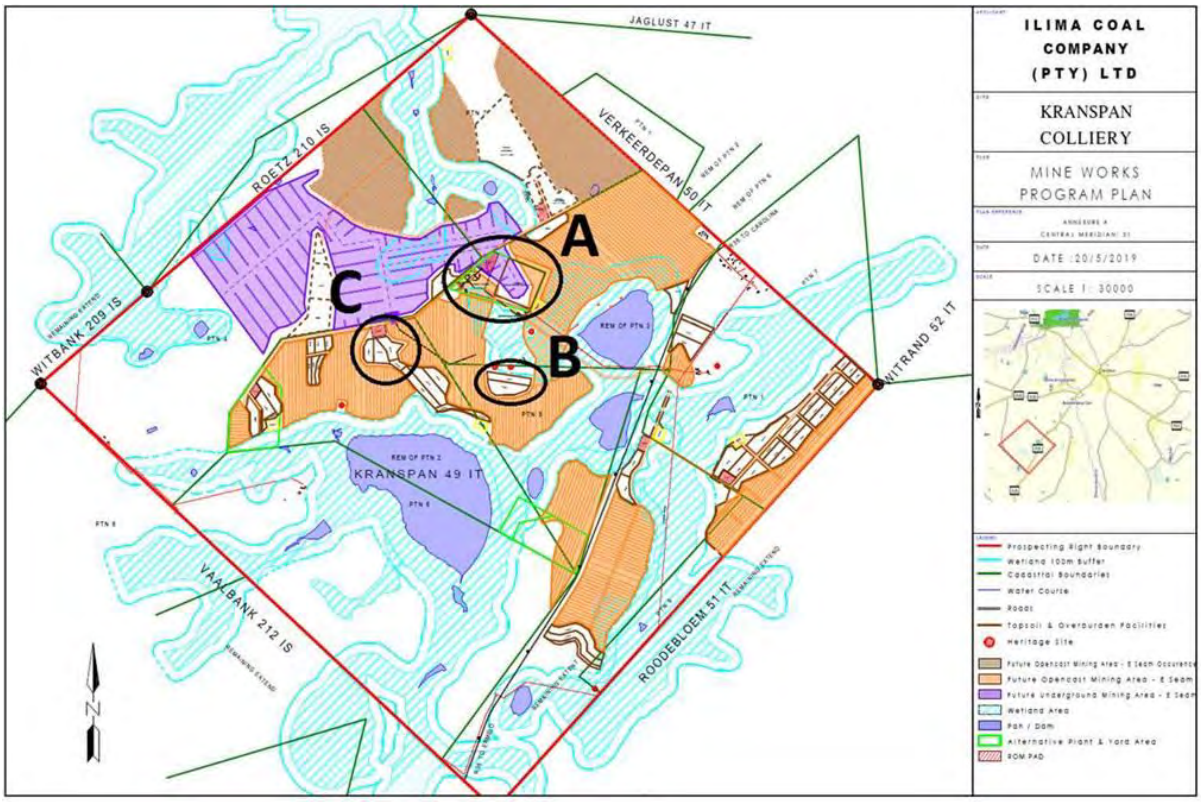

Figure 31: New site layout

- *A – New Plant / Offices / Surface option Co-Disposal position.*
- *B – New Overburden Facilities, on a no-coal zone where the old surface Co-disposal was planned.*
- *C – New Overburden Facilities: No underground mining will take place in these areas.*
    - *B & C - Due to limited overburden facility space, these areas had to be included.*

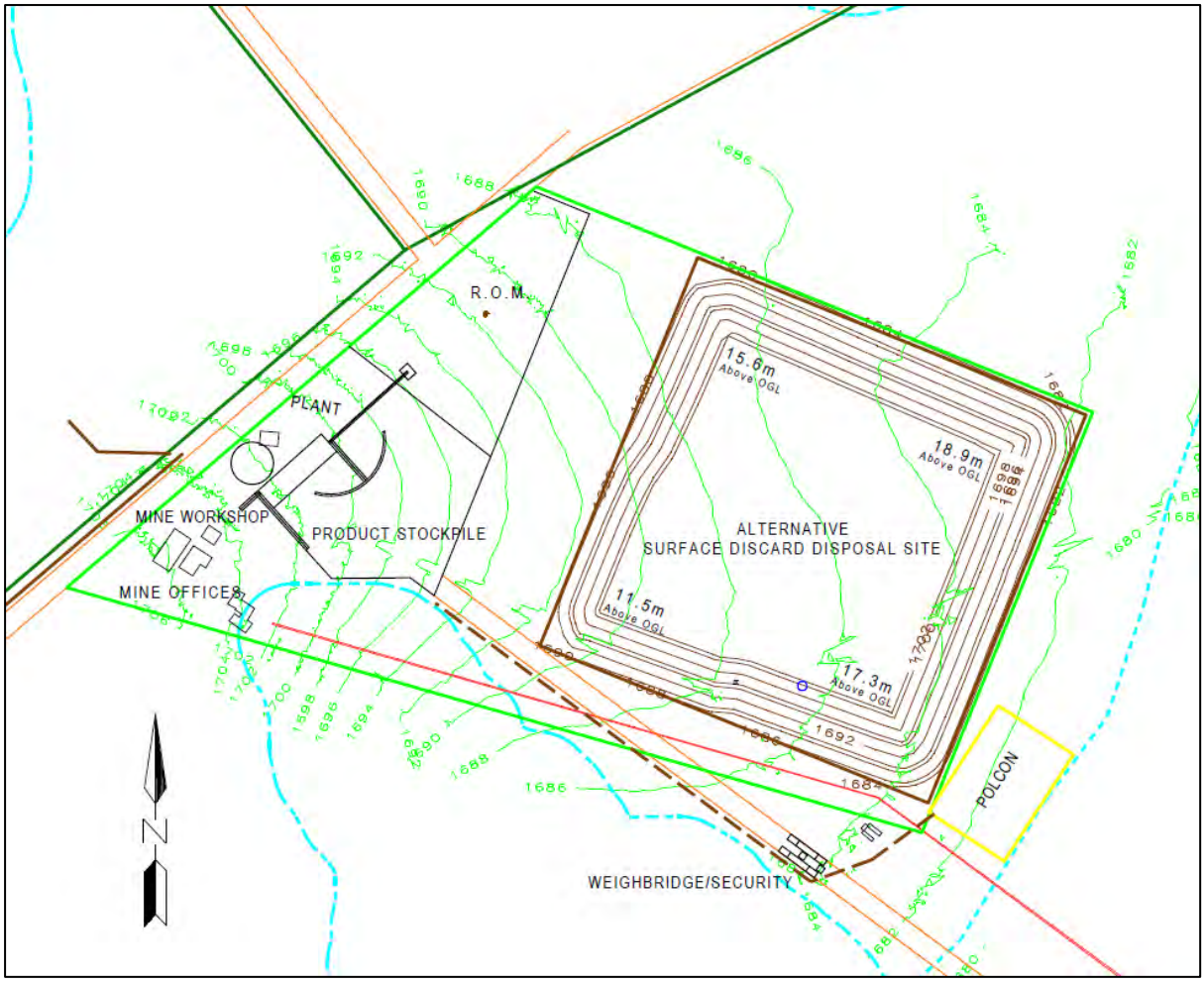

Figure 32: New plant layout

Social Impact Assessment

Application for Environmental Authorisation, Waste Management Licence and Water Use Licence

Ilima Coal Company Kranspan Project

April 2019

ABS Africa

Sustainability Advisors

EXECUTIVE SUMMARY

Socio-Economic Baseline Environment

The proposed mining right area is located within Chief Albert Luthuli Local Municipality (CALLM) which forms part of the Gert Sibande District, within the Mpumalanga Province.

There are approximately 187 630 people residing in the municipality.

Opportunities for employment, linked to sustainable economic growth, are an important concern for the CALLM.

The mining sector is identified within the Chief Albert Luthuli Local Municipality Integrated Development Plan (2017/ 22 Part 2) as a sector with development potential.

Land Uses

Current land uses within the proposed MRA surface area are as follows:

- Cultivated fields, comprising of predominantly maize;
- Farm roads and agricultural infrastructure including boreholes;
- Cattle farming; and
- Farm steads.

Land uses on immediately adjacent properties include the following:

- R36 Main Road to Carolina / Breyten;
- Unnamed gravel road on the western boundary of the proposed mining rights area;
- Msobo Coal Mine;
- Jagtlust Colliery and the planned extension;
- School;
- Northern Coal Mine;
- Rail tracks;
- Agriculture; and
- Farm steads.

Potential Impacts

A summary description of the most significant social aspects and impacts identified are as follows:

Positive

- The proposed development will ensure that the current 350 Ilima employees will remain employed instead of retrenchments having to be implemented due to current operational mine closures. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever practicable will increase the significance of this positive impact;
- Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community;

- Implementation of the HRD programme, as described in the SLP is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy for employees and in the wider community;
- The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the payment of rates and taxes to the CALLM. The Project will result in the availability of an additional source of coal for the Eskom market;
- Benefits will accrue with respect to royalties and taxes to the Government of South Africa;

Negative

- A temporary influx of people seeking employment can be expected during the construction phase especially. This will place additional demand on municipal services in the area, such as public safety, health care, water, sanitation, and housing. The impact can be mitigated through cooperative planning with the CALLM;
- Parts of the proposed mining area are currently used for commercial agriculture. During the operational phase, less agricultural product will be available from Kranspan. This impact is however likely to be temporary as the land may be returned to agriculture after rehabilitation has been completed. The loss of agricultural product from Kranspan, relative to the size of the local market, is also considered to be insignificant and the temporary impact is thus not deemed to be a risk to food security either locally or regionally;
- There may be some temporary loss of employment for farm workers as affected farm portions are mined. Affected farm workers may find alternative employment with the mine or other farms nearby;
- Minor, major and fatal injuries from potential mine health and safety incidents. There are multiple health and safety risks associated with surface and underground mining, ore processing and movement of man and materials. In addition, the mine will store and handle various hazardous substances including explosives. Implementation of a comprehensive health and safety management programme and adherence to legislation governing mine health and safety requirements will mitigate this impact;
- Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities;
- Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of a community safety incident, which may include loss of life. The post-mitigation impact significance rating is Low due to the ability to prevent these impacts through adherence to the relevant legal requirements on mine health and safety and the mitigation measures in the EMPr; and
- Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme.

Impact Statement

Key findings of the social impact assessment for the proposed mine development on the Farm Kranspan are as follows:

- The proposed development will result in a change to the current socio-economic environment. This change will result in several positive and negative impacts;
- The proposed development has the potential to create employment and economic development opportunities for local communities during the construction and operational phases of the mine;

- The mine SLP has provided costed plans for optimising local employment, skills development and a commitment to implementing local economic development projects, identified in collaboration with the CALLM;
- Several negative social impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated;
- Provided that the mitigation measures in this report and the measures in the mine SLP are implemented, it is the opinion of the EAP that the authorisation may be granted; and
- Compliance with the mitigation measures in this report should be included as conditions of the environmental authorisation.

TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF ACRONYMS AND ABBREVIATIONS

CALLM	Chief Albert Luthuli Local Municipality
CBA	Critical Biodiversity Area
CRR	Comment and Response Register
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DoL	Department of Labour
DSR	Draft Scoping Report
DTI	Department of Trade and Industry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
GSDM	Gert Sibande District Municipality
GW	Gigawatts
HDSA	Historically Disadvantaged South African
I&APs	Interested and Affected Parties
IDA	Ilima Development Agency
IDP	Integrated Development Plan
IRP	Integrated Resource Plan
IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Wastewater Management Plan
kg	kilogramme
Kcal/kg	Kilocalories per kilogramme
kl	Kilolitre
ktpa	Kilotons per annum
ktpm	Kilotons per month
l	litre
m	Metre
mamsl	Metres above mean sea level
Mj/kg	Megajoules per kilogramme
mm	Millimetre
MPRDA	Minerals and Petroleum Resources Development Act
MR	Mining Right
MRA	Mining Right Application
Mtpa	Million tons per annum
MW	Megawatts
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act

NEM:WA	National Environmental Management: Waste Act
NHRA	National Heritage Resources Act
NWA	National Water Act
p.a.	Per annum
PCD	Pollution Control Dam
PR	Prospecting Right
PRA	Prospecting Right Application
RBCT	Richards Bay Coal Terminal
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African Heritage Resource Agency
SDF	Spatial Development Framework
WML	Waste Management Licence

NEMA EIA Regulations (2014) Appendix 6 Requirements

NEMA REGULATIONS (2014) - APPENDIX 6	RELEVANT PAGE / SECTION IN REPORT
Details of the specialist who prepared the report.	Section 3
The expertise of that person to compile a specialist report including curriculum vitae.	Section 3 Appendix 1
A declaration that the person is independent in a form as may be specified by the competent authority.	Section 4
An indication of the scope of, and the purpose for which, the report was prepared.	Introduction Section 2
The date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Not Applicable
A description of the methodology adopted in preparing the report or carrying out the specialised process.	Section 2 Section 10
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.	Not Applicable
An identification of any areas to be avoided, including buffers.	Not Applicable
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Not Applicable
A description of any assumptions made and any uncertainties or gaps in knowledge.	Section 2.3
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment.	Section 11
Any mitigation measures for inclusion in the environmental management programme report	Section 12
Any conditions for inclusion in the environmental authorisation	Not Applicable
Any monitoring requirements for inclusion in the environmental management programme report or environmental authorisation.	Not Applicable
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised.	Section 13
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the environmental management programme report, and where applicable, the closure plan.	Sections 12 and 13
A description of any consultation process that was undertaken during the course of carrying out the study.	Not Applicable
A summary and copies if any comments that were received during any consultation process.	Assessment of comments received during the Scoping Phase is presented in Section 8.4
Any other information requested by the competent authority.	Not applicable.

ABS Africa
Sustainability Advisors

Date: April 2019

SOCIAL IMPACT ASSESSMENT
PRIESKA ZINC COPPER PROJECT, COPPERTON, NORTHERN CAPE

1 INTRODUCTION

The Applicant, namely Ilima Coal Company (Pty) Ltd. (Ilima) is the holder of a prospecting right over several portions of the Farm Kranspan. (DMR Reference No: MP30/5/1/2/2/102PR).

The coal seams of interest form part of the Ermelo Coalfield. Completed prospecting activities within the prospecting rights area have resulted in the delineation of the coal seam deposits which can be economically mined.

The applicant is thus now applying for a Mining Right.

Although there are five coal seams present within the proposed mining right area, only the E Seam can be mined economically (Ilima, 2018). Two coal products are expected to be produced from the mining. Approximately 70% of the mined coal is planned to be beneficiated and then exported via the Richards Bay Coal Terminal (RBCT). The remaining 30% will be thermal coal, supplied to Eskom for power generation.

The planned operations would comprise of surface and underground mining.

The Social Impact Assessment (SIA) was undertaken to inform the Scoping and Environmental Impact Report undertaken for an Environmental Authorisation (EA), WML and IWULA. The SIA facilitates an understanding of the receiving environment (providing a baseline description) and the identified impacts to the social environment which may be associated with the proposed project implementation. The study comprises of a qualitative assessment of identified impacts related to the Project's activities.

2 SCOPE OF WORK AND APPROACH

2.1 SCOPE OF WORK

The scope of work for the SIA was as follows:

- Identify and review the social aspects of the mining development. These aspects will indicate the potential positive and negative social benefits of the development for the surrounding affected communities and provide the basis for identifying the potential changes in the social status of the communities; and
- Characterise the social status using secondary data from 2018-2019 Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) of the Gert Sibande District Municipality (SBDM), Chief Albert Luthuli Local Municipality (CALLM) and Census 2011.

2.2 APPROACH

The approach included the steps below:

- Development of a pre-development understanding of the social baseline environment characterising the intended mining area;
- Consideration of the project description and analysis of the manner and extent to which the planned activities may affect the social environment;
- Review of legislative policies and documents;
- Incorporation of relevant information and outcomes from specialist studies and the Project interactions to date with stakeholders and Interested and Affected Parties (I&APs). This was done to ensure that the SIA considered the issues, concerns, and comments raised by those involved and participating in the Environmental Impact Assessment (EIA);
- Identification and assessment of potential social impacts likely to be caused by the proposed project activities; and
- Development of mitigation measures to eliminate (where possible) and reduce or minimise the potential negative impacts identified and enhance potential positive impacts.

2.3 ASSUMPTIONS AND LIMITATIONS

Advisory on Business and Sustainability Africa (Pty) Ltd. (ABS Africa) has prepared this report specifically for Ilima Coal Company (Pty) Ltd. (Ilima). The contents of this report:

- Are based on the legal requirements for undertaking an Environmental Impact Assessment, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Ilima and ABS Africa;
- Are specific to the intended development at the proposed site. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report;
- Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Ilima and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof;
- The assessment has been based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the EMPr;
- Where relevant, the impact assessment has placed reliance on the information and recommendations in the specialist studies completed for the Project;
- It has been assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration; and
- The post-mitigation impact is based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the Life of Mine (LOM).

3 EXPERTISE OF THE SPECIALIST

Chané Pretorius completed her BSc Honours in Geography and Environmental studies at the University of Johannesburg in 2011. She has over 6 years' experience in the field of social and environmental assessment. Her project experience includes the management and compilation of local and international Environmental and Social Impact Assessments, in compliance with local and international requirements. She has undertaken projects in South Africa, Zimbabwe, DRC, Mozambique, Mali and Ghana.

Paul Furniss is a Director at ABS Africa with more than 17 years' experience in environmental and social impact assessments. He has a MSc Degree in Environmental Science and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Registration No. 400086/07). His project experience includes conducting social and environmental assessment studies in South Africa, Nigeria, Lesotho, Namibia, Sudan, Democratic Republic of Congo, Botswana, Zimbabwe, and Mozambique.

Curriculum vitae are provided in **Error! Reference source not found.**.

TABLE 3-1: SPECIALIST DETAILS

Report Authors:	Chané Pretorius / Paul Furniss
Company:	ABS Africa (Pty) Ltd
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E-mail:	chane@abs-africa.com

4 DECLARATION OF INDEPENDENCE

ABS Africa is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of professional environmental services as stipulated in the terms of reference.

5 OVERVIEW OF PROPOSED DEVELOPMENT

5.1 LOCATION

The Kranspan Project is located approximately 13 km south-west of the town of Carolina in Albert Luthuli Local Municipality, Mpumalanga Province (Figure 1). The project area covers approximately 3383 hectares and comprises nine portions of the farm Kranspan 49-IT. Ilima has been granted a Prospecting Right for this area (No. 44/2016 (PR) [MP30/5/1/2/2/102PR]), which expires in March 2019.

5.2 PLANNED OPERATIONS

The mine planning and detailed engineering is ongoing and the surface area extent of the planned infrastructure may change.

Based on the mine planning studies completed to date, the following is proposed:

- Surface (open pit) mining focusing on extraction of the E Seam via the roll over mining method;
- Follow-up phases of mining focused on extraction of the E Seam will be achieved through underground mining via the bord and pillar method;
- Establishment and maintenance of topsoil, overburden and a discard stockpile;

- Following extraction, the coal product will be dry crushed and screened on-site. To meet the export coal quality specifications, 70% of the coal will be beneficiated on site through an on-site coal washing plant with filter press;
- Coal discard from the wash plant will be disposed of in-pit as part of the rehabilitation of the surface mining. Alternatively, the discard will be disposed of in an engineered stockpile on surface. Both disposal options will be investigated and assessed in the S&EIR process;
- Dewatering of seepage water will be required for both the surface and underground mining over the Life of Mine (LOM). Water removed from pits and the underground workings will be retained in pollution control dams; and
- Establishment and maintenance of various ancillary mine support infrastructure will be required.

Below is a summarised list of the proposed mining activities to be undertaken.

- Exploration geophysical surveying, drilling, pit sampling and trenching;
- Clearing and grubbing (surface mining areas and surface infrastructure footprint);
- Topsoil removal and stockpiling (surface mining areas and surface infrastructure footprint);
- Overburden removal and stockpiling;
- Drilling and blasting (when necessary, surface and underground mining);
- Excavation of coal and material transfer to a coal stockpile area (surface and underground mining);
- Dry crushing and screening at the product loading area;
- Beneficiation of the export coal product; and
- Loading, hauling and transport of coal product (surface and underground mining).

FIGURE 5-1: LOCALITY MAP

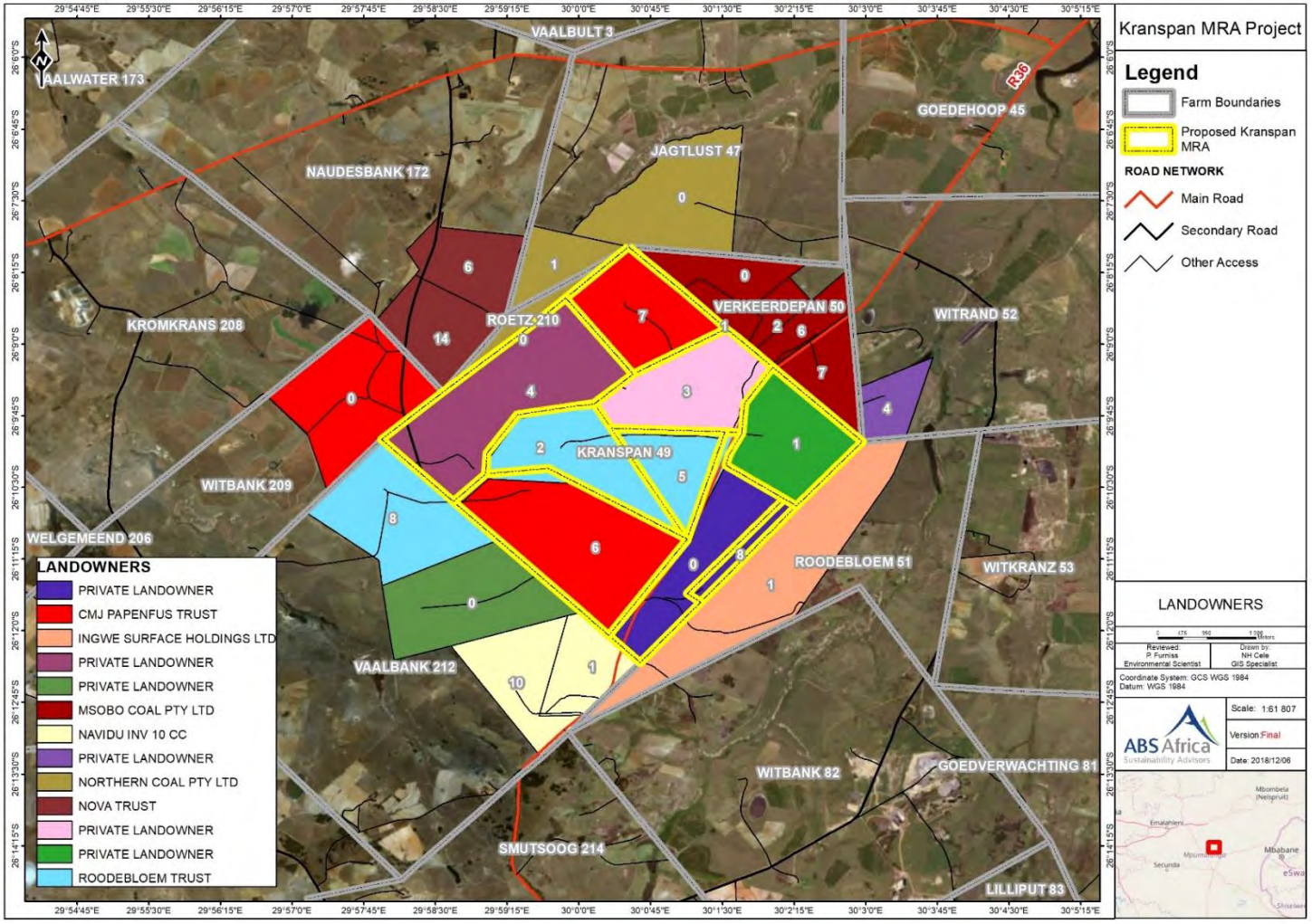


FIGURE 5-2: SURROUNDING LANDOWNERS MAP

6 POLICY AND LEGISLATIVE CONTEXT

6.1 OVERVIEW

A summary list of the various legislation of relevance to the SIA is provided below:

6.1.1 ACCESS TO LAND, LAND USE AND DEVELOPMENT PLANNING

- Less Formal Township Establishment Act 113 of 1991
- Restitution of Land Rights Act 22 of 1994
- Land Reform (Labour Tenants) Act 3 of 1996
- Communal Property Associations Act 28 of 1996
- Interim Protection of Informal Land Rights Act 31 of 1996
- Communal Land Rights Act 11 of 2004
- Local Government Transition Act 209 of 1993
- Local Government: Municipal Structures Act 117 of 1998
- Local Government: Municipal Systems Act 32 of 2000
- Spatial Planning and Land Use Management Act 16 of 2013
- Chief Albert Luthuli Local Municipality Integrated Development Plan (2018/2019)
- Chief Albert Luthuli local municipality Service Delivery and Budget Implementation Plan (2018/2019)

6.1.2 MINING AND MINERAL RIGHTS

- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)
- Minerals and Petroleum Resources Development Amendment Act 49 of 2008
- Mine Health and Safety Act 29 of 1996

6.1.3 ENVIRONMENTAL MANAGEMENT

- National Environmental Management Act 107 of 1998 (NEMA)

6.1.4 AGRICULTURAL RESOURCES

- Conservation of Agricultural Resources Act 43 of 1983
- Subdivision of Agricultural Land Act 70 of 1970

6.1.5 BIODIVERSITY

- National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)
- Game Theft Act 105 of 1991
- Animals Protection Act 71 of 1962
- National Veld and Forest Fire Act 101 of 1998
- Nature Conservation Ordinance 19 of 1974
- Mpumalanga Nature Conservation Act 10 of 1998

6.1.6 WATER

- National Water Act 36 of 1998

- National Water Amendment Act 27 of 2014
- Water Services Act 108 of 1997

6.1.7 ROADS AND TRAFFIC

- National Land Transport Act 5 of 1998
- Road Traffic Act 29 of 1989

6.1.8 POLLUTION

- Health Act 63 of 1977
- Hazardous Substances Act 115 of 1973
- National Environmental Management: Waste Act 59 of 2008
- National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA)
- Department of Environmental Affairs National Dust Control Regulations (2013)
- National Atmospheric Emissions Inventory System

6.1.9 HERITAGE AND CULTURAL RESOURCES

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)

7 BASELINE SOCIAL ENVIRONMENT

7.1 SOCIO-ECONOMIC ENVIRONMENT[1]

7.1.1 CHIEF ALBERT LUTHULI LOCAL MUNICIPALITY

The proposed mining right area is located within the Gert Sibande District, within the Mpumalanga Province.

Gert Sibande District comprises of seven local municipalities, being Chief Albert Luthuli, Dipaleseng, Govan Mbeki, Lekwa, Mkhondo, Muskaligwa, and Pixley KaSeme (Figure 7-1).

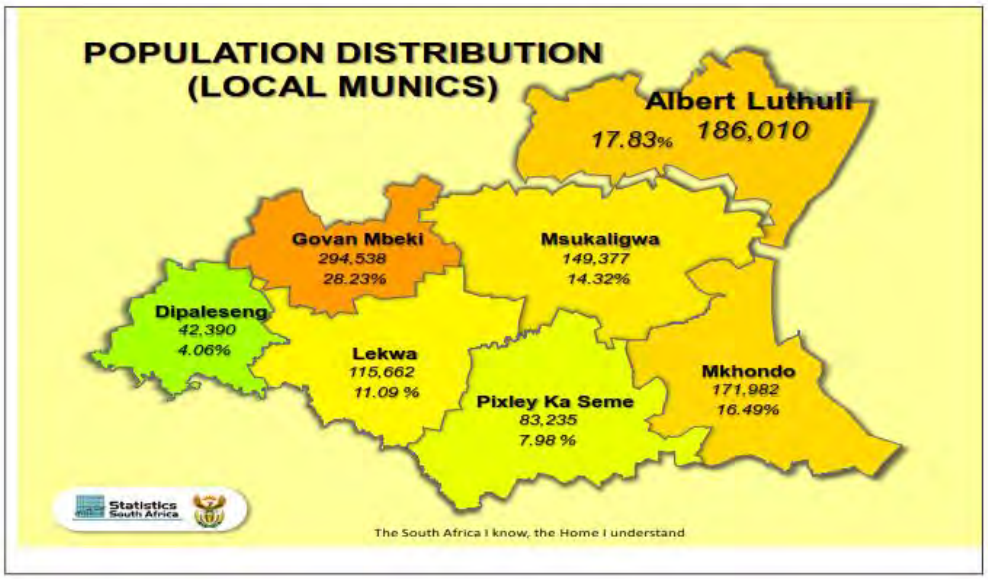


FIGURE 7-1: LOCAL MUNICIPALITIES

Chief Albert Luthuli is rated a Medium Capacity Municipality, which comprises of 5 formally declared towns, namely Carolina, Emanzana, Elukwatini, Empuluzi/Mayflower and Eklulindeni. The administrative head office of the municipality is situated in Carolina, with a satellite office at each of the other towns.

The Municipality has 47 750 households, and 186 010 citizens. Located on the eastern escarpment of the Mpumalanga Province, the surface area is approximately 5 560 km^2. A summary of the key statistics of the municipality is provided in Table 7-1.

7.1.2 SPATIAL DEVELOPMENT FRAMEWORKS AND INTEGRATED DEVELOPMENT PLANS

The GSDM IDP (2018/2019) identifies leading industries in terms of employment in the district as follows:

- Trade (18.8%);
- Community services (17.0%),
- Mining (14.5%) and
- Agriculture (13.9%).

The IDP notices a decrease in the role of agriculture and trade as employer and an increase in the role of community services and mining as employer.

[1] There is a general lack of recent published demographic and other socio-economic data for the area. Except where noted, the information in this section has been summarised from Statistics South Africa Census Data (2011)

The spatial development trajectory of the district is guided by the set of development principles outlined below:

- Actively protect, enhance and manage the natural environmental resources of the District by way of the guidelines provided in the GSDM Environmental Management Framework (EMF);
- Optimally capitalise on the strategic location of the District through strengthening of the five national/provincial economic corridors, and to functionally link all towns and settlements to one another and to surrounding regions;
- Establish a functional hierarchy of nodal points in the Gert Sibande District area to optimize the delivery of social and engineering infrastructure/services, promote local economic development, and protect valuable agricultural land;
- Provide a full range of social services at all the identified nodal points, in accordance with the nationally approved Thusong Centre concept;
- Consolidate the urban structure of the District around the highest order centres by way of residential infill development and densification in Strategic Development Areas (SDAs) identified in Municipal Spatial Development Frameworks;
- Ensure that all areas in the GSDM (urban and rural) are at least provided with the constitutionally mandated minimum levels of services as prescribed by the NDP and enshrined in the Constitution;
- Utilise the Chressiesmeer-Heyshope-Wakkerstroom precincts as Tourism Anchors around which to develop and promote the eastern parts of the District (around route R33) as a Primary Tourism Corridor;
- Promote forestry within and along the identified Primary Tourism Corridor;
- Promote intensive and extensive commercial farming activities throughout the District and facilitate Agrarian Transformation within the CRDP priority areas;
- Facilitate and accommodate mining in the District in a sustainable manner in order to support local electricity generation and industrial development;
- Unlock the industrial development potential of existing towns through developing industry specific Special Economic Zones/Economic Clusters throughout the District, in line with the Mpumalanga SDF and the Mpumalanga Vision 2030 Strategy in accordance with the following sectors:
  - Agricultural Cluster
  - Forestry Cluster
  - Industrial Cluster
- Enhance business activities (formal and informal) in the Central Business Districts of identified nodal points in the District and consolidate business activities around Thusong Centres and modal transfer facilities in rural areas.

The findings of the CALLM IDP (2018/2019) is summarised as follows:

- The 2018/19 IDP's strategic objectives:
  - Strategic Objective 1: Capitalise on the regional spatial development initiatives;
  - Strategic Objective 2: Focus development on development corridors and nodes;
  - Strategic Objective 3: Protect biodiversity and agricultural resources;
  - Strategic Objective 4: Economic development and job creation supporting and guiding the spatial development pattern of Mpumalanga;

- Strategic Objective 5: Accommodating urbanisation within the province;
- Strategic Objective 6: The integration of the historically disadvantaged communities into a functional nodal and settlement pattern;
- Strategic Objective 7: Tenure upgrading;
- Strategic Objective 8: Promote the development of rural areas that can support sustainable economic, social and engineering infrastructure);
- Strategic Objective 9: Infrastructure Investment; and
- Strategic Objective 10: Development of Metropolitan Areas

- Mining is the third largest job creating initiative in CALLM with 7.6% contribution to employment and 7.9% contribution to the economy.
- "The Management of Downscaling and Closure Programme provides for cases of retrenchments by the mine. This must, where possible, practicable and reasonable cover the skilling of people either in basic life skills, financial skills and SMME training."
- The mining sector is viewed as one of the main economic sectors which is key to spur the economic growth and employment in the Chief Albert Luthuli Municipality.
- In the municipality's SWOT analysis, mining is listed under strengths as an economic driver, as well as under threats as exploitation of labour by small scale mining.
- The challenges of mining in CALLM is the short lifespan of open cast coal mining operations as well as the management of mine waste and waste water from mines in the Chief Albert Luthuli Local Municipality area.
- There is further no mention of mining being a threat for CALLM. The IDP states that the purpose of the SDF is to determine that there are no clashes of mine areas with areas allocated for other uses. The SDF showed that the Kranspan area clashes with no areas of importance.

There are currently two spatial development frameworks of relevance to the study area, namely the proposed Provincial Spatial Development Framework for Mpumalanga published on the 1st of February 2019 (Mpumalanga SDF, 2019) and the Chief Albert Luthuli Local Municipality Spatial Development Framework (2017) (CALLM, 2017).

The Mpumalanga SDF (2019) is composed of 3 phases namely:

- Phase 1 the Policy Context Report which highlights the Policy context that guides Spatial Planning and Spatial Context and develops a Draft Vision statement for the Province;
- Phase 2 the Spatial Challenges and Opportunities Report which consists of a biophysical analysis, a built environment analysis and a socio-economic analysis; and
- Phase 3 the Spatial Proposals Report which sets objectives in support to achieve the Draft Vision of the SDF.

According to the Mpumalanga SDF (2019), the proposed Kranspan mining right area falls within the area allocated for mining.

Mpumalanga SDF (2019) identifies a supporting ecological corridor present within the proposed Kranspan mining right area. This mostly relates to the Boesmanspruit River that flows just south of the Kranspan farm. The other supporting ecological corridor near Kranspan, located north of the mining right area is the Vaalwaterspruit, both these ecological corridors flows into the Nooitgedacht Dam.

It is understood that the R36 is scheduled for rehabilitation and upgrading under Phase 3. This may have an effect on the mine traffic as the R36 runs through the proposed Kranspan mining site.

The 2017 SDF for CALLM was obtained directly from the Chief Albert Luthuli Local Municipality. This SDF correlates and complements the newly published PSDF.

7.1.3 POPULATION

There are approximately 187 630 people residing in the municipality (StatsSA 2016 Community Survey). The major forces that drive population growth in the area are fertility, mortality, migration, HIV prevalence and access to Anti Retro Viral medicine.

The most dominant population group in the Municipality are Black African individuals, who represent more than 97.6% of the total population in the municipal area. White and Indian/Asian population groups comprise around 1.6% and 0.4% of the population respectively. The dominant languages in Chief Albert Luthuli Local Municipality are Siswati and isiZulu. Siswati is the most widely spoken language (56.6%).

TABLE 7-1: KEY STATISTICS OF CHIEF ALBERT LUTHULI MUNICIPALITY

KEY STATISTICS	NUMERICAL VALUE
Total population	187 630
Young (0-14)	36.5%
Working age (15 - 64)	58.2%
Elderly (65+)	5.3%
Dependency Ratio	71.7%
Gender Ratio	88.2.3%
Growth Rate	-0.09% (2001 - 2011)
Population density	33 person/km^2
Unemployment rate	35.4%
Youth unemployment rate	45.1%
No schooling aged 20+	19.9%
Higher education aged 20+	6.3%
Matric aged 20+	27%
Number of Households	47.705%
Number of Agricultural Households	19.113
Average Household size (person)	3.8
Female headed households	49.3%
Formal dwellings	76.5%
Housing owned/paying off	56.3%
Flush toilet connected to sewerage	18.9%
Weekly refuse removal	19.3%
Piped water inside dwelling	22.6%
Electricity for lighting	87.5%

Source: Statistics South Africa (2011)

7.1.4 Educational Facilities and Education

A total of 111 schools can be found in Chief Albert Luthuli Municipality, 48 of which are Secondary institutes.

19.9% of the municipal population has not attended any type of a schooling system, while 95.5% have primary school education. A little over 1901 individuals (0.11%) have graduated from a University / Technikon.

In Chief Albert Luthuli Municipality, around 27 % of adults have a matric certificate compared to 29 % in the Mpumalanga Province. The percentage of the population with a tertiary education in Chief Albert Luthuli (6.3%) is also lower than that for the Mpumalanga Province (9.6%).

The nearest school to the site is Ezindongeni primary school, situated approximately 600m south-west of the western boundary of the proposed MRA and Kromkrans primary school which is situated approximately1.6km north-west of the proposed MRA. The land on which Ezindongeni primary school is built is owned by Ilima.

7.1.5 Access to Water, Sewage and Solid Waste Services

Piped water is accessed by about 68.7% of the Municipalities population and about 18.9% of the municipal population have access to flush toilets. About 19.3% of the population have access to a weekly refuse collection service[2].

7.1.6 Housing

Within the Chief Albert Luthuli Local Municipality, 76% of households live in formal units, while 18% are found in informal housing units.

A variety of residential components are available within the municipal boundaries. More than 15.3% of household dwellings found in the Municipality can be classified as Urban. Some 77.5% of local dwellings can be described as Tribal/Traditional.

The average household size in Chief Albert Luthuli Local Municipality is about 3.8, female headed households is about 49%, formal dwellings at 86% and the housing owned is at 52%.

7.1.7 Public Safety and Security

The Municipality has one fully-fledged fire station in Carolina, and a satellite fire station in Elukwatini; as well as an operational fire engine and three rescue vehicles.

7.1.8 Community Health and Health Facilities

Health services are provided by clinics and hospitals in both urban and rural areas. There are a total of twenty one (21) clinics in the Chief Albert Luthuli Municipal area; grouped into two clusters; the Northern Cluster from Diepdale to Carolina (10), and Southern Cluster from Hartebeeskop to Badplaas (11).

In addition, there are two Level 1 Hospitals (Carolina Hospital and Embhuleni Hospital), which receive patients referred from the clinics and provides outpatient services as well.

Mpumalanga is one of the three (3) Provinces with the highest infection rates of HIV / AID"s. Latest statistics for the Province reveal an increase in the District infection rate. HIV prevalence rate of pregnant women was 43.2% in 2011 - increasing between 2001 & 2011. HIV prevalence rate excluding pregnant women was 21.6% (2011) - decreasing trend.

The municipality is responsible for the provision of graves to the communities for burials and maintenance of 6 municipal cemeteries. They are at Emanzana, Carolina, Ekulindeni, Elukwatini, Mayflower and Silobela. Other

[2] CALLM DIDP (2017/ 22 Part 1)

areas are falling within the tribal authority and are using the tribal cemeteries, which are spread throughout the villages at times.

7.1.9 ELECTRICITY AND ENERGY

Around 87.5% of household dwellings found in Chief Albert Luthuli Local Municipality have access to electricity. The Municipality is licensed to distribute electricity in Carolina, Silobela and part of Emanzana only. Eskom is licensed for the bulk supply and reticulation in the former Ekulindeni, Elukwatini and Empuluzi TLC areas. Electrification of households in the rural areas, the informal settlements and parts of Silobela Township is a compelling necessity.

Households with connection to electricity 51 383 in 2016 – the share of households connected to electricity improved to a level of more than 96% in 2016 – 1 902 households however are not connected to electricity at all (none).

As shown in Figure 7-2, the majority of the population have access to electricity, which is used primarily for cooking, heating and lighting. The proportion of households within the municipality that use electricity for lighting has increased from 50.9% in 2001 to approximately 87.5% in 2011.

Although relatively expensive, paraffin and gas are used for cooking and heating in some places. Households using electricity as a source of energy for cooking in 2011 is 50.8%.

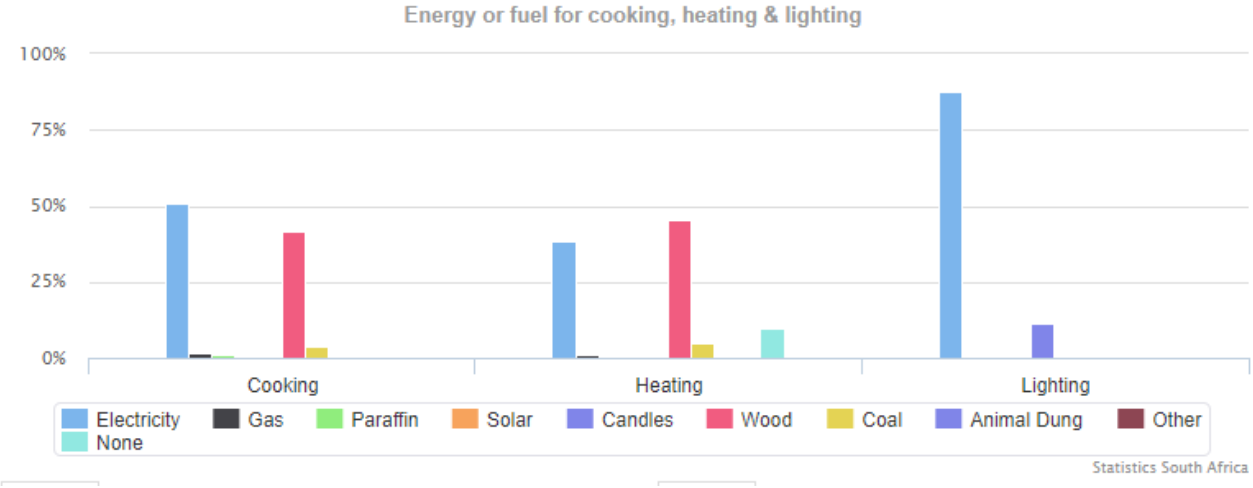


FIGURE 7-2: SUMMARY OF ENERGY OR FUEL FOR COOKING, HEATING & LIGHTING

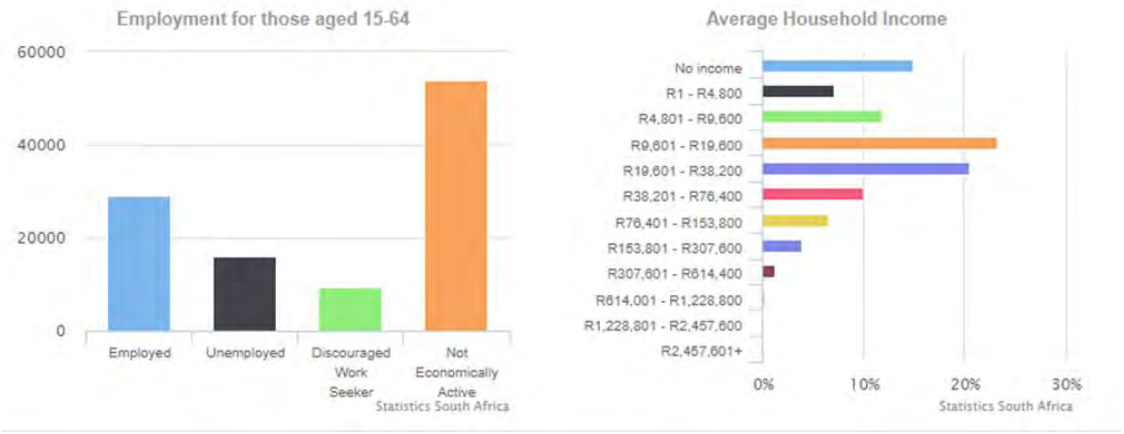
7.1.10 EMPLOYMENT[3]

Between 2001 and 2011, there has been a decrease in the number of people unemployed and a concomitant increase in the number of employed people across the Chief Albert Luthuli Local Municipality.

35,4% of the 45 116 economically active individuals (i.e. those who are employed or unemployed but looking for work) are unemployed. Of the 24 506 economically active youth (15–35 years) in the municipality. 35.8% of youth remain unemployed in 2011.

The average household income is approximately R 9 601 – R 19 600. Obtaining any form of income generating employment within the municipality has become increasingly difficult in recent years. This is attributed to the lack of education, resulting in the uneducated experiencing the high incidences of poverty.

[3] Statistics South Africa (2011)



Source: Statistics South Africa (2011)

FIGURE 7-3: SUMMARY OF EMPLOYMENT AND INCOME

7.1.11 ECONOMY

The Spatial Economy and Development Rationale, part of the CALLM IDP, noted the following:

- The overall economic outlook for the municipality is good, however there are a few concerns worth noting;
- High Prevalence of HIV means that 44% of the population require treatment for HIV and the food to support the use of the treatment;
- High unemployment rate among people in the 14 – 64 age group (economically productive years);
- The unemployment rate in the Municipality is 35,4% (2011); females 42% and males 28% - and the unemployment rate for young people is alarmingly high at 45%, which is mainly influenced by the lack of economic opportunities in the municipal area. The highest number of unemployed (54%) is in Ward 12 (Ekulindeni area) and the lowest number (20%) is in Ward 21 (Carolina area);
- Employment in the Municipality increased by 8 600 jobs between 2001 and 2011, and the number of employed individuals is 29 141 (0,12%). The percentage of employment in formal sector was 65,6%, and in the informal sector 21,9% (StatsSA 2011); and
- The main economic drivers are the municipality sector and the construction sector.

The mining sector is identified within the Chief Albert Luthuli Local Municipality Draft Integrated Development Plan (2017/ 22 Part 2) as a sector with development potential.

7.1.12 LOCAL COMMUNITIES

There is a local community within the mining right area, situated on Portion 1 of the Farm Kranspan. A consultative survey was undertaken on the 27th of February 2019 to engage with the community, to establish the socio-economic dynamics and capture concerns the community may have in terms of the proposed mining project. From the survey, it was noted that the community consists of approximately 12 families, residing in approximately 50 informal structures.

A summary of the findings of the consultative survey undertaken for the community on Portion 1 of the Farm Kranspan is presented in Table 7-2.

It is understood that the the community on Portion 1 of the Farm Kranspan 49 is in negotiations with Msobo Coal (Pty) Ltd. for the potential relocation of the community. Although the potential impacts of the proposed Ilima mining activities on this community have been assessed in the S&EIR Process, it is understood that the community is likely to be relocated before the proposed Ilima mining activities proceed. will be relocated by the adjacent Msobo mine. The impacts anticipated on the community on Portion 1 as per the specialist reports will thus be reduced.

TABLE 7-2: SUMMARY OF SOCIO-ECONOMIC CONDITIONS OF LOCAL COMMUNITY WITHIN THE PROPOSED MINING RIGHT AREA

Farm Name (reside)	Portion (reside)	Race	Gender	Language (Home)	No of people residing in house	Small scale crops	Personal Animals grazing on farm	No. of animals	Reliance on waterbodies	Read and Write	Level of Education	Occupation	Housing type	Energy source
Kranspan 49	1	Black	Female	IsiZulu	1	None	None	N/A	River + Borehole	No	None	Unemployed	Mud-house	Electricity
Kranspan 49	1	Black	Male	IsiZulu	4	Maize, potatoes, beans	Cows	20	small dam / Dry during winter	No	None	Unemployed	Mud-house	Electricity
Kranspan 49	1	Black	Female	IsiZulu	7	Potatoes grown last year	Chickens/Cows	20 Chickens 2 Cows	Watertank filled by borehole / stream when tank is empty	Yes	Grade 3	Unemployed	Mud-house	Electricity
Kranspan 49	1	Black	Male	IsiZulu	1	None	Cows	3	Borehole / small river that's dry during winter	No	None	Unemployed	Mud-house	Electricity
Kranspan 49	1	Black	Male	IsiZulu	10	None	Cow	1	spring / borehole with electric pump	Yes	Grade 12	ADT operator	Mud-house	Electricity
Kranspan 49	1	Black	Female	IsiZulu	2	None	None	N/A	spring / borehole with electric pump	No	None	Unemployed	Mud-house	Electricity

7.2 DESCRIPTION OF CURRENT LAND USES

7.2.1 EXISTING SURFACE LAND USES

Existing land uses over the Kranspan Farm include the following:

- Cultivated fields, comprising of predominantly maize and soya;
- Farm roads and agricultural infrastructure including boreholes;
- Community on Portion 1;
- Cattle farming; and
- Farm steads.

Historically the area has been utilised for intensive commercial cultivation of annual crops and grazing of livestock with a significant amount of coal mining in close proximity (less than 5 km).

Parts of the land proposed for the mining operation and the beneficiation facilities is existing farmland that has been zoned as such and is already extensively transformed by these activities.

There are no registered land claims applicable to the properties under consideration. (Appendix 5**Error! Reference source not found.**).

7.2.2 SURROUNDING LAND USES

Surrounding land uses include the following:

- R36 Main Road to Carolina / Breyten;
- Community on RE of the Farm Witbank 209;
- Unnamed gravel road on the western boundary of the proposed mining rights area;
- Msobo Coal Mine;
- Jagtlust Colliery and the planned extension;
- Ezindongeni and Kromkrans primary schools;
- Rail tracks;
- Agriculture; and
- Farm steads.

8 PROJECT NEED AND DESIRABILITY

8.1 NEED

The proposed mining rights area comprises part of the Mpumalanga coal fields. The latter accounts for over 82% of South Africa's coal production (SA Chamber of Mines, 2018).

At a macro-level, there are essentially three market segments for bituminous coal, these are (Ilima, 2018):

- Eskom Low Grade Coal (19.0 Mj/kg – 23.3 Mj/kg)
- Export RB1 Grade Steam Coal (>5,900 Kcal/kg)
  RB2 Grade Steam Coal (>5,500 Kcal/kg)
- Metallurgical High-Grade Coal

In 2016, South Africa produced 253.1 Mt of coal of which 181.4 Mt were sold internally with a value of R 61.5 billion while 68.9 Mt, worth R 50.5 billion, were exported (SA Chamber of Mines, 2018).

Given the size and quality of the reserve, the proposed Kranspan Colliery intends to target both the export and Eskom markets and will be a multiproduct operation (Ilima, 2018).

8.1.1 ESKOM MARKET

Coal plays an important role in the South African economy and is the primary energy source for electricity generation (Department of Energy, 2018). At present, approximately 82% of South Africa's power generation is from coal (SA Chamber of Mines, 2018).

The domestic demand for coal is led by electricity generation (53%), then the basic iron and steel sector (20%), followed by the synthetic fuel and chemical industries (10%).

Security of energy supply is recognised throughout the world as a key factor for the economic and social development of a country. In addition, the availability of a secure electricity supply is a fundamental consideration for any investment decision, particularly for energy-intensive sectors like industry and manufacturing. South Africa's economic development policies and plans, including the National Development Plan 2030, provide a strong focus on the latter and the availability of a cost-effective and consistent quality electricity supply is therefore vital for the country's economy.

The National Development Plan 2030 also identifies the need for South Africa to reduce its reliance on coal for power generation. The draft Integrated Resource Plan (IRP), published by the Department of Energy in August 2018, indicates that by 2030, coal will comprise approximately 44% of total installed power generation capacity (Figure 8-1). This is inclusive of the planned decommissioning of approximately 12 GW of installed coal capacity over the same period. Other notable aspects from the draft 2018 IRP with respect to coal include:

- An additional 1 000 MW of new installed coal power generation is planned for the period 2023-2024; and
- By 2040, coal is projected to contribute less than 30% of the energy supplied and less than 20% by 2050.

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas/Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39,126	1,860	2,196	2,912	1,474	1,980	300	3,830	499	Unknown
2019	2,155					244	300			200
2020	1,433				114	300				200
2021	1,433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1,000	1,500		2,450		200
2027					1,000	1,600		1,200		200
2028					1,000	1,600		1,800		200
2029					1,000	1,600		2,850		200
2030			2,500		1,000	1,600				200
TOTAL INSTALLED	33,847	1,860	4,696	2,912	7,958	11,442	600	11,930	499	2,600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

	Installed Capacity
	Committed/Already Contracted Capacity
	New Addional Capacity (IRP Update)
	Embedded Generation Capacity (Generation for own use allocation)

Source: https://www.cliffedekkerhofmeyr.com/en/news/publications/2018/projects/energy-alert-28-august-the-draft-integrated-resource-plan-2018-the-roadmap-for-future-generation-capacity-.html

FIGURE 8-1: ENERGY MIX IN THE 2018 INTEGRATED RESOURCE PLAN

From the above, it can be concluded that the demand for coal for use in the electricity sector will decrease as other primary energy sources and the related installed generation capacity is established. However, there will be a need for coal for the country's power generation requirements for at least the next three decades.

8.1.2 EXPORT MARKET

South Africa is a net exporter of coal and exports amount to 6% of total global exports (SA Chamber of Mines, 2018). Almost all coal exported from South Africa is steam coal, most of which is exported through RBCT.

In 2016, total coal exports were valued at R 50.5 billion. Although subject to significant price volatility, the average export price per tonne is typically higher than the average domestic price per tonne. Approximately 70% of the proposed Kranspan Colliery is planned to be sold to the export market via the RBCT (Ilima, 2018).

Between 2004 and 2009, the export market was previously dominated by export to countries in Europe (Netherlands, Spain, and the United Kingdom). From 2009 to 2014, China and India were the most important export markets for South African coal. Almost 45% of all export coal from South Africa is currently shipped to India.

The SA Chamber of Mines (2018) indicates that India's coal demand is expected to increase in the foreseeable future, despite that country's commitment to reduce its GHG emissions intensity by between 20% to 25% by 2020. Other potential markets are noted to be Pakistan, Malaysia, Taiwan, Bangladesh and South Korea. Export risk factors which may influence the export market for South African coal are:

- Demand reduction as a result of more stringent environmental legislation in importing countries; and
- The adoption of new coal power generation technology which requires a higher quality coal.

8.2 DESIRABILITY

The desirable aspects of the proposed Kranspan Colliery include the significant socio-economic benefits associated with employment, procurement of goods and services. Community benefits such as skills development and education opportunities will also be realised from the implementation of the mine Social and Labour Plan.

Furthermore, royalties and taxes from the coal mine will accrue to the government of South Africa.

Notwithstanding these benefits, coal extraction and processing does present several physical, social and environmental hazards. These hazards can generally be managed through the application of various engineering design standards and the health, safety and environmental procedures and plans which the operating company implements during the day to day operation of the site.

Other specific aspects related to the desirability of the proposed Kranspan Colliery include:

- The proposed colliery will introduce a new source of air emissions near to the Highveld Priority Area. Coal mining, handling and transportation results in the release of various airborne pollutants like NO_2, SO_2 and particulate matter which, depending on pollutant concentration and duration of exposure among others, can have a negative impact on human and ecosystem health;
- Given the proximity of mining to surface and groundwater resources, there is a high likelihood of water pollution if water management on the site is not properly practiced;
- For the Life of Mine, the colliery will result in an increase in traffic volume on the R36, including heavy vehicles like ADTs. This may negatively influence traffic flows, accelerate degradation of the road surface and possibly result in collision incidents;
- The mining and mineral processing is likely to result in a loss of some remaining natural habitat within a listed threatened ecosystem; and
- In response to climate change concerns and the dominant contribution of CO_2 emissions from coal combustion, several developed economies in the world are selecting low carbon alternatives to coal-fired power plants. Recently, global institutions like the Organisation for Economic Co-operation and Development (OECD), World Bank Group and various financial institutions have agreed to limit public financing of coal-fired power plants.

The desirability of the Project, within the context of the above, is summarised as follows:

- The Project will result in the availability of an additional source of coal for the Eskom market;
- Benefits will accrue with respect to royalties and taxes to the Government of South Africa;
- Direct and indirect employment opportunities will be created at a time when unemployment is historically at its highest;
- South Africa has committed to becoming less reliant on coal and moving towards a low carbon economy. However, this transition is expected to be gradual, with the draft IRP (2018) identifying the need for coal for power generation for at least the next two decades;
- The S&EIR process conducted for the proposed development has not identified any significant risks or impacts associated with the development at the proposed site which are irreversible, or which cannot be mitigated;
- With the appropriate environmental controls in place, the proposed development is considered to be compatible with surrounding land uses;
- The proposed development is consistent with the spatial development planning context applicable to the area; and

- With proper rehabilitation and mine closure planning and implementation, the land surface can be restored to productive use post-mining with no irreversible latent or residual environmental impacts.

Accordingly, it is concluded that there is a need for the Project and that undesirable aspects of the development can be satisfactorily mitigated.

8.3 NO DEVELOPMENT OPTION

Should the proposed project not be implemented, Kranspan will remain as is and:

- The royalties and tax revenue from mining will not accrue to the South African Government;
- The local economic development opportunities associated with the procurement of local goods and services to support the mine activities will not be realised;
- Projected employment opportunities during the construction and operational phases will not be fulfilled;
- The various social development projects under discussion with local government as part of the applicant's social and labour plan commitments, will not be implemented; and
- The additional surface infrastructure needed for the mining will not be constructed and the potential negative impacts of the mining and related activities will not occur.

8.4 INTERESTED AND AFFECTED PARTY COMMENTS

Various comments have been received by interested and affected parties as part of the public participation process undertaken to date. The concerns listed in the Final Scoping Report can largely be categorised[4] as follows:

- Blasting and noise impacts caused by adjacent mines;
- Potential blasting and noise impacts of the proposed Kranspan Mine project;
- Potential relocation due to proximity to the opencast area;
- Surface and groundwater degradation; and
- Degradation of air quality.

The categorisation is shown graphically Figure 8-2.

in general, the comments reflect concerns related to the possible direct and indirect impacts of the proposed mining activities on existing land uses in the area

[4] Queries related to the EIA Process, such as requests to be registered as an I&AP or for copies of a report,were excluded from the categorisation

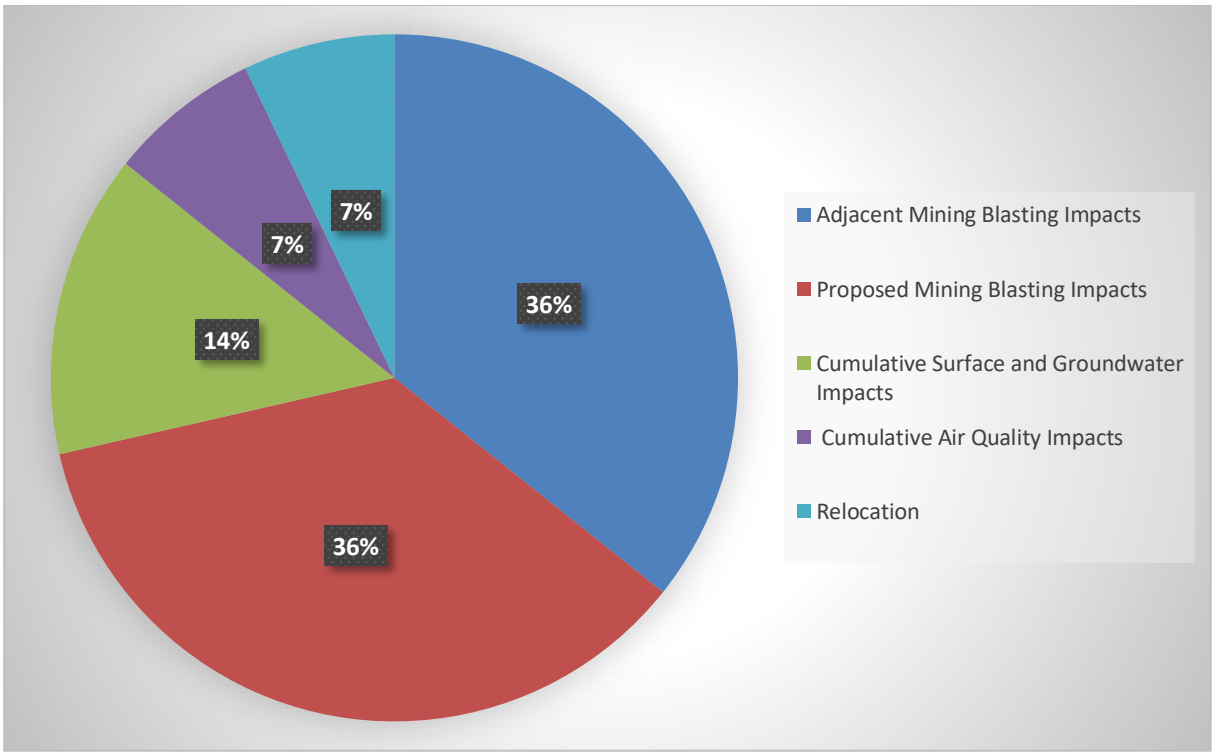


FIGURE 8-2: CATEGORISATION OF CONCERNS RAISED BY I&APS

8.5 FINDINGS OF SPECIALIST STUDIES

Several specialist studies were undertaken for the proposed Kranspan mine project. The key findings of these studies with relevance to the social environment are summarised in the section below.

8.5.1 HERITAGE IMPACT ASSESSMENT

The historic structures (KP 9, 12, 17, 21 and 22) should be assessed by a conservation architect if they are to be impacted on by the development who will make suitable recommendations for mitigation, after which a destruction permit can be applied for from the relevant heritage authority.

The cemeteries located in the pit area (KP 4,5,7 and 18) will be directly impacted on. It is recommended that these cemeteries are preserved in situ, fenced with an access gate for family members, with a 50-meter buffer zone. If this is not possible the cemeteries can be relocated adhering to all legal requirements.

The cemeteries KP 14 and 16 could be indirectly impacted by the development and it is therefore recommended that the cemeteries are preserved in situ, fenced with an access gate for family members, with a feasible buffer zone.

It is recommended that before construction starts, it should be confirmed whether the identified stone cairns represent graves (KP 8 and 20 are located within the impact area).

8.5.2 NOISE IMPACT ASSESSMENT

The impact of an intruding industrial/mining noise on the environment rarely extends over more than 5 km from the source (Airshed, 2019). Noise sensitive receptors within 5 km of the project (indicated in Figure 4 of the specialist report), include individual homesteads and small informal settlements.

8.5.3 AIR QUALITY IMPACT ASSESSMENT

Prior to dispersion modelling, 14 receptors were identified in the vicinity of the Project (within the 20-by-20 km modelling domain). Sensitive receptors include schools, residential areas, informal housing and farmsteads Impact on surrounding water users;

It is recommended that the informal housing and nearby school be relocated, and that the two on-site farmsteads be purchased before mining commences. The proposed Project operations should then not result in significant ground level concentrations or dustfall levels at the nearby receptors provided the design mitigation measures are applied effectively.

8.5.4 GROUNDWATER IMPACT ASSESSMENT

In summary, the impact on groundwater availability in private boreholes within the anticipated zone if influence in the fractured rock aquifer could have a significant negative impact. This is mainly due to the fact that farmers in the area are solely dependent on groundwater and surface water for water supply. Current farming activities and domestic use could temporarily cease over the life of the operations as a result of mine dewatering. It is shown that the most significant lowering in groundwater levels are associated with the northern sections of the mine, where the coal seams are deeper. In this area, groundwater levels may be lowered by up to 40m in the fractured rock aquifer. The weathered aquifer is expected to dry up in this area. In the south-eastern section, the impact is expected to be less pronounced, as the depth of mining is shallower.

8.5.5 SURFACE WATER ECOSYSTEMS ASSESSMENT

The proposed development area was shown to incorporate a relatively high proportion of wetland habitat units, ranging from valleyhead seeps, hillslope seeps, channelled and unchannelled valley-bottom and depression-type wetland units.

The wetland units were shown to all fall within a C PES category (moderately modified), with a high ecological importance and sensitivity.

The DWS risk assessment indicates that all activities that will impact the wetland directly carry a high risk factor. The impact significance ratings also indicate that the potential impacts carry a high significance before mitigation. The significance of the impacts is largely due to the direct involvement of deleterious impacts to wetland habitat units. The significance is, however, largely dependent on the amount of wetland habitat that will be included into the layout planning and the severity of those impacts.

8.5.6 BLASTING IMPACT ASSESSMENT

There will be a negative impact from blast induced ground vibration in two cases (R36 road and a farm dwelling in the south western part of the operation). This can be achieved through timing designs and initiation systems that ensure only one hole fires per instant in time during a blast.

8.5.7 ECOLOGICAL IMPACT ASSESSMENT

Design Open-cast areas to exclude the areas of Untransformed Grassland in the northern quarter of the project area and to avoid all Unchannelled Valley-bottom Wetlands and Seeps, particularly those where African Marsh Harrier (EN) and African Grass Owl (VU) have been confirmed to occur.

Relocate Overburden facilities and Haul Roads to avoid all High or Med-High ES vegetation communities.

9 SOCIAL AND LABOUR PLAN

9.1 OVERVIEW

The Applicant has compiled a Social and Labour Plan (SLP) in accordance with the requirements of the Minerals and Petroleum Resources Development Act 28 of 2002 and Mining Charter III.

The SLP addresses the Applicant's plans for ensuring that it achieves commercial success whilst also developing its employees and community for the better and in compliance with transformation targets as stipulated in the Mining Charter II, as it may be amended and developed from time to time.

It is noted within the SLP that various community and social investment initiatives, have commenced or are in the process of commencing, including and is discussed in more detail in the sections below.

Ilima established a Future Forum that provides an opportunity for management and selected employee representatives to meet and discuss issues related to the SLP and the future of the company. The Forum attempts to formulate solutions to challenges and issues that arise from time to time.

Further, Ilima is represented in the LED Forum of Chief Albert Luthuli Municipality. The purpose of this Forum is to integrate all the SLP projects into the IDP of CALLM and promote the attainment of development objectives for the region. It also attempts to diversify the regional economy in a manner that is independent of mining.

The SLP implementation progress is also reported throughout the year to the Board of Directors of Ilima Coal Company.

9.2 HUMAN RESOURCE DEVELOPMENT PROGRAMME

The company aims to employ an integrated HRD programme that seeks to maximise the productive potential of people involved with the mine and to equip them with accredited and transferable skills to be able to seek alternative employment at the end of LOM. The following plans will be implemented to achieve this objective.

- A Skills Development Plan;
- A Mentorship Plan;
- An Internship and Bursary Plan;
- A Career Progression Plan; and
- An Employment Equity Plan.

9.3 LOCAL EMPLOYMENT

The SLP includes an undertaking to give preference and priority to employing local inhabitants.

9.4 EDUCATION AND TRAINING

lima has tried to achieve compliance with the Mining Charter's requirement that every employee should be given an opportunity to become functionally literate. The company started the AET programme in 2016 and identified fifteen 15) employees to participate in the programme. The service provider was aid for all the fifteen (15) employees but only five (5) participated and three (3) of them dropped out during the programme, only two (2) wrote exams.

In light of the above facts, the company has decided to support an on-going AET programme for the community during this SLP period where possible. In Ilima's consultation with the facilitator of the community based AET programme funded by the Department of Basic Education, the enrolment in this programme is very poor as well. The employees of the company and that of the contractors will be encouraged to participate in the community AET programme if they are interested. The company will explore other options to fund other programmes for

education within the community instead of the AET programme during this SLP period to ensure that funds are spent on programmes that will produce positive results for the community. Table 9-1 shows the target for the AET programme.

	Cumulative Need	Target Enrol-ments 2018	Target Enrol-ments 2019	Target Enrol-ments 2020	Target Enrol-ments 2021	Target Enrol-ments 2022	Total Enrol-ments (2018 to 2022)
AET Level 1	1	0	1	0	0	0	1
AET Level 2	1	0	1	0	0	0	1
AET Level 3	3	0	1	1	1	0	3
AET Level 4	2	0	1	1	1	1	4
Total No. of ABET Enrolments	7	0	4	2	2	1	9
% of Mine Workforce Functionally Literate and Numerate (ABET Level 4)	97%	97%	98%	98%	98%	99%	
Total workforce	207	207	207	207	207	207	

FIGURE 9-1: AET TRAINING TARGETS FOR ILIMA FOR 2018 – 2022 FINANCIAL YEARS

Source: Ilima Coal Company Social and Labour Plan, 2018-2022

9.5 SKILLS DEVELOPMENT PLAN

Ilima will implement a Skills Development Plan that focuses on equipping employees with skills to promote their progression in the mining industry and their development into other sectors according to their aspirations.

The numbers of people, levels of skills, and types of skills development programmes for employees who are involved in the Ilima operation will be contained in the Workplace Skills Plan (WSP) to be submitted annually to the Mining Qualifications Authority (MQA) by Ilima and contractors. In addition to this, Ilima and its contractors at the mine have Training Policies for their workforce at the mine, which outlines the structures that will be used to report on skills training and development programmes. The objective of the Training Policies is to provide quality learning and growth opportunities for people development in pursuit of individual and operational goals.

As such, the Training Policies are the vehicle through which the company's skills development strategy is interpreted into a practical and standardised process where the following outcomes can be delivered:

- An appropriately qualified workforce;
- The opportunity to develop the potential of all employees;
- The creation of a culture of continuous improvement.

Core Business Area	Target: 2018 Expected Enrolments	Target: 2019 Expected Enrolments	Target: 2020 Expected Enrolments	Target: 2021 Expected Enrolments	Target: 2022 Expected Enrolments	Total Expected Enrolments 2018 to 2022
Mining Equipment Operators	56	56	56	56	56	280
Safety Rep Training	3	3	3	3	3	15
First Aider	20	20	20	20	20	100
Novice Training	4	4	4	4	4	20
Total	83	83	83	83	83	415
Total Workforce in Mining	181	181	181	181	181	

Source: Ilima Coal Company Social and Labour Plan, 2018-2022

FIGURE 9-2: TRAINING AND SKILLS DEVELOPMENT PROGRAMMES

9.6 LOCAL ECONOMIC DEVELOPMENT

Based on extensive research in the local Carolina community, it was decided that the most effective means by which to promote socio-economic development within the community would be to form a Community Development Trust. This trust has formed Ilima Development Agency (IDA) which is a central pivot mechanism around which all LED projects are initiated. The Agency is 100% owned by the local community in the form of the Trust and is truly broad-based in its nature. Currently the Agency is run by a Board of Trustees of which one (1) member was born and bred within the local community of Carolina and three (3) members are representatives from Ilima. Institutional, infrastructural, and financial support is provided by Ilima; however, the Agency can also source funding from other businesses around the area and from other development institutions. Thus, the entity is empowered and capacitated by Ilima to become a self-reliant and sustainable Agency into the future beyond mine closure.

Ilima has entered into a project management contract with IDA where the entity manages all development projects and community up-liftment activities initiated by Ilima around the area. The primary aim of the IDA is to utilise the window of opportunity created by mining to promote meaningful socio-economic up-liftment and human resource development of the community. Further, the company is wholly committed to involvement in plans that already exist or are envisaged at a government level and aims to use its expertise and resources for the benefit of all affected parties. Figure 9-3 below illustrates the structure of the Trust and the projects already initiated.

The socio-economic development programmes which are initiated by Ilima are:

- Feasible, realistic, sustainable and functional;
- Meaningful and responsive to the social, cultural and economic conditions of the community;
- Promote social and economic development;
- Improve the living standard of the local community;
- Encourage the involvement and self-reliance of communities;
- Promotes quality of learning and teaching.

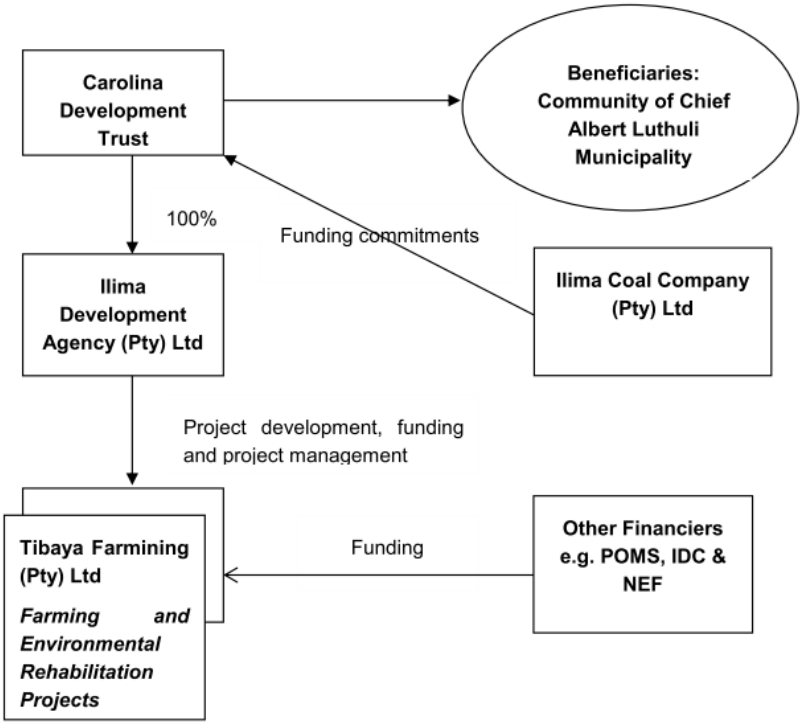


FIGURE 9-3: STRUCTURE OF CAROLINA DEVELOPMENT TRUST (CDT)

The activities of the Agency are geared towards achieving the following objectives:

- Promote meaningful socio-economic upliftment within targeted communities;
- Focus specifically on the initiation of job-creation enterprises;
- Provide the skills necessary to advise on the realization of community-based projects;
- Increase the average household income of families living in surrounding communities; and
- Develop an entrepreneurial base in the community who are able to initiate alternative sustainable development projects, which are non-reliant on the mine, and which promotes the on-going sustainability of the community beyond mine closure.

9.6.1 INFRASTRUCTURE

The company seeks to focus on the agricultural sector in terms of Local Economic Development projects since the community of Carolina is largely dependent on this sector for its daily livelihood. Hence, the proposed LED Project for this SLP is a Cattle Farming Project and purchase of additional farming land to sustain all the farming ventures that the company initiated and funded under Tibaya Farming Project (Pty) Ltd. The company also proposed an Entrepreneurial Development Programme to diversify its LED intervention to maximise benefits for the community. This programme aims to identify entrepreneurs or small businesses within the community of Carolina and assist them financially and with business mentorship to grow their businesses to be more sustainable and create additional jobs for the community.

The Infrastructure projects that are proposed in this SLP are the construction of six (6) additional classrooms for the Violet Jiyane School and the fencing of Carolina Cemetery. The Violet Jiyane School starts from grade seven (7) until grade nine (9) and the plan is to grow the school until it has grade twelve (12). The six (6) additional classrooms will enable the school to have grade seven (7) until grade twelve (12). In addition to the six classrooms, the company will construct other facilities for the school to improve the quality of learning and

teaching. The fencing of the cemetery has been identified by the CALLM as one of the priority projects in the IDP for 2017 – 2022.

The proposed projects are designed to respond to the development challenges and unemployment problems faced by the local community as highlighted in the census 2011 and Community Survey 2016 reports.

TABLE 9-1: LOCAL ECONOMIC DEVELOPMENT PROJECTS

PROJECT	OBJECTIVES	5 YEAR BUDGET
Cattle Farming Project	The project has been designed to take advantage of farming opportunities around the Chief Albert Luthuli Municipality, specifically in Carolina. The aim of the company is to invest in various farming projects and create more jobs in the agricultural sector.	R 3 350 708
Purchase of Farming Land	Since the company decided to invest in farming projects in the current and previous SLP, a need for more farming land is necessary to ensure that these projects are sustainable in the future.	R 8 186 514
Entrepreneurial Development Programme	The company will invite interested entrepreneurs or small businesses from the local community to submit proposals or apply for financial and mentorship assistance. Through the selection panel, the company will select an entrepreneur, or a small business that has a potential of growth and assist it with funding and business mentorship to grow the business.	R 1 750 000
Violet Jiyane School Six (6) Additional Classrooms	Ilima will assist with the construction of six (6) classrooms and other school facilities to upgrade the school until grade 12 with two classrooms per grade.	R 3 000 000
Fencing of Carolina Cemetery	The Fencing of Carolina Cemetery Project is one of the projects that have been identified by the Project Municipality as priority projects in the IDP for 2017 – 2022.	R 2 900 000

9.7 PROCUREMENT PROGRESSION PLAN

Ilima's procurement policy provides Historically Disadvantaged South African (HDSA) and surrounding communities with a preferred supplier status in all three (3) levels of procurement, namely: capital goods, consumables and services. Procurement will be used by Ilima as one of the primary mechanisms to boost LED in the communities affected by its operation. Where preferential procurement is not possible due to a lack of capacity in local communities, local people will be provided with training opportunities. This will be achieved through implementing the following measures:

- Using the Ilima Development Agency (IDA) as a vehicle by which local suppliers will be capacitated and empowered to provide appropriate services to the mine;
- Forming of partnerships with HDSA suppliers;
- Encouraging suppliers to form partnerships, joint ventures, or consortia with HDSA supplier companies where there is no HDSA company tendering to supply the required goods or services;
- Providing a complete list of products and services which are required by Ilima and that could be supplied by HDSA companies;
- Communicating with the Department of Trade and Industry (DTI) to identify HDSA companies with necessary capacity wishing to operate in the industry.
- Ensuring that tender requirements are comprehensively communicated to HDSA companies;
- Assisting aspiring HDSAs in the formulation of appropriate business plans;

- Assist HDSAs in identifying external markets outside of the company with a view to becoming more self-sufficient and less dependent on mining for income opportunities.

All of the above measures will be managed by the IDA.

9.8 MANAGEMENT OF DOWNSCALING AND RETRENCHMENT

Ilima will follow the procedures for downscaling and retrenchment as set out by the Department of Labour (DoL) and the Labour Relations Act:

- Establish a joint labour management committee (Future Forum) at mine site level that will focus on the implementation and monitoring of the SLP and which will be responsible for the statutory notifications related to retrenchment;
- Downscaling and Retrenchment Plan during this period by allocating five percent (5%) of its SLP budget annually to be utilised to prepare employees for this process. All parties involved in this process will assist the company to implement this plan. In addition, parties will agree on the following principles:
- Prevent job losses and decline in employment through turnaround or redeployment strategies and to seek alternative solutions and potential measures to prevent a decline in employment;
- Promote a culture of self-employment and self-maintenance, aimed at improving access to employment opportunities for those that are unemployed;
- Seek to implement measures aimed at improving the quality of life of employees that may be retrenched in the future;
- Promote on-going discussions between the Company and its stakeholders in respect of challenges experienced by either of the parties, relating to possible alternative job creation projects;
- Jointly and openly discuss issues that concern the employees' future and jointly structure and implement possible solutions to job losses; and
- Jointly engage in strategic planning, deployment or other appropriate strategies that affect jobs, and evaluate progress at regular intervals.

10 IMPACT ASSESSMENT

10.1 OVERVIEW

The impact assessment methodology comprised of a risk-based impact matrix in which the outcomes, impacts and residual risk of the project activities was determined as follows:

- Step 1: Identify and describe the impact in terms of its nature (negative or positive) and type (direct or indirect);
- Step 2: Assess the impact severity (including reversibility and the potential for irreplaceable loss of resources), impact duration and impact spatial scale (extent);
- Step 3: Assign an impact consequence rating;
- Step 4: Assess the impact probability;
- Step 5: Assign the impact significance rating;
- Step 6: Identify measures and controls by which the impact can be avoided, managed or mitigated; and
- Step: Repeat the impact assessment on the assumption that the mitigation measures are applied and assign the residual impact (post mitigation) significance rating.

The purpose of the impact assessment was not to identify every possible risk and impact which the proposed project activities may have on the receiving social environment. Rather, the assessment was focused on identifying and assessing the most material impacts, commensurate with the nature of the project activity and the characteristics of the receiving social environment.

All impacts were assessed in the following phases:

- Construction;
- Operation; and
- Decommissioning and Closure.

The various impact rating criteria used and how they were applied are described in the section that follows.

10.2 APPLICATION OF IMPACT RATING CRITERIA

The first phase of impact assessment is the identification of the various project activities which may impact upon the identified environmental and social categories.

The identification of significant project activities is supported by the identification of the various receiving environmental receptors and resources. These receptors and resources allow for an understanding of the impact pathways and assessment of the sensitivity of the receiving environment to change.

The significance of the impact is then assessed by rating each variable numerically, according to defined criteria as provided in Table 10-1. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact.

The severity, spatial scope and duration of the impact together comprise the consequence of the impact; and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact and can obtain a maximum value of 10.

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table 10-2 and Table 10-3.

The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The NEMA Precautionary Principle is applied in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes are adjusted. Arguments and descriptions for such adjustments, as well as arguments for each specific impact assessments are presented in the text and encapsulated in the assessment summary table linked to each impact discussion.

The assessment of impacts is done initially for the scenario where no mitigation measures are implemented. Mitigation measures are then identified and considered for each impact and the analysis repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

TABLE 10-1: CRITERIA FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5
SPATIAL SCOPE OF IMPACT	**RATING**
Activity specific	1
Area specific	2
Whole project site / local area	3
Regional	4
National/International	5
DURATION OF IMPACT	**RATING**
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5
FREQUENCY OF ACTIVITY / DURATION OF ASPECT	**RATING**
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5
FREQUENCY OF IMPACT	**RATING**
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

CONSEQUENCE

LIKELIHOOD

***Activity**: a distinct process or task undertaken by an organisation for which a responsibility can be assigned.*
***Environmental aspect**: an element of an organisation's activities, products or services which can interact with the environment.*
***Environmental impacts**: consequences of these aspects on environmental resources or receptors.*
***Receptors**: comprise, but are not limited to people or man-made structures.*
***Resources**: include components of the biophysical environment.*
***Frequency of activity**: refers to how often the proposed activity will take place.*
***Frequency of impact**: refers to the frequency with which a stressor will impact on the receptor.*
***Severity**: refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.*
***Spatial scope**: refers to the geographical scale of the impact.*
***Duration**: refers to the length of time over which the stressor will cause a change in the resource or receptor.*

TABLE 10-2: SIGNIFICANCE RATING MATRIX

LIKELIHOOD (FREQUENCY OF ACTIVITY + FREQUENCY OF IMPACT)	CONSEQUENCE (SEVERITY + SPATIAL SCOPE + DURATION)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

TABLE 10-3: POSITIVE/NEGATIVE MITIGATION RATINGS

COLOUR CODE	SIGNIFICANCE RATING	VALUE	NEGATIVE IMPACT MANAGEMENT RECOMMENDATION	POSITIVE IMPACT MANAGEMENT RECOMMENDATION
	Very High	126-150	Improve current management	Maintain current management
	High	101-125	Improve current management	Maintain current management
	Medium-High	76-100	Improve current management	Maintain current management
	Low-Medium	51-75	Maintain current management	Improve current management
	Low	26-50	Maintain current management	Improve current management
	Very Low	1-25	Maintain current management	Improve current management

11 IMPACT ASSESSMENT OUTCOMES

Several impacts on the social environment have been assessed by the relevant technical specialists as summarised in Section 8.5 of this report. These impacts are not re-assessed in the tables that follow but it is important to note that they are part of the overall Project impact to the social environment.

Regular review of the mitigation measures recommended for these impacts, informed by the required monitoring to be undertaken, should be undertaken to ensure that these impacts are managed over the LOM.

The assessed impacts per project phase are provided below. The complete impact matrix for each impact is presented in **Error! Reference source not found.**.

11.1 LAND USE

The impact on land use will primarily occur during the construction and operational phases of the project.

Acquisition of the surface rights by the Applicant may cause a temporary economic displacement of farm workers if they are unable to be employed by the mine or find alternative employment on nearby farms.

It is likely that a number of traditional medicinal plants occur in the project area. Due to health and safety concerns if mining commences, these medicinal plants may not be accessed as freely.

TABLE 11-1: BREAKDOWN OF CURRENT LAND USES FOR KRANSPAN*

Farm Name	Farm Portion	Crops on farm	Used for planting (Ha)	Crop Yield (Tonnes p/Ha)
KRANSPAN 49	1	Maize + Soya	78	Maize: 6-9 Soya: 1,5-2,5
KRANSPAN 49	3	Maize + Soya	(a third) 130	Maize: 6-7 Soya: 2
KRANSPAN 49	4	Maize + Soya	340 (rest for grazing)	Maize: 8 Soya: 3
KRANSPAN 49	6	Maize + Soya	(Half) 304	Maize: 8 Soya: 3
KRANSPAN 49	7		(Half) 172	
KRANSPAN 49	RE	Maize + Soya + Pastures	215 + 14 for pastures	Maize: 6-10 Soya 1.5
KRANSPAN 49	8			
KRANSPAN 49	2	Maize + Soya	290	Maize: 8 Soya: 2-3
KRANSPAN 49	5			

*Information provided by landowners or their representatives in response to survey questionnaire[5]

11.2 EMPLOYMENT AND ECONOMY

The agricultural sector of the region represents the strongest contributor to the Gross Geographic Product (GGP), and is therefore an established sector of the economy into which other development initiatives could be directed. This would serve to diversify the economy away from the mining sector, given that mineral reserves are a depleting resource. Ilima has therefore decided to thus attempt, through its LED initiatives, to create a more varied and self-reliant community which is not dependant on mining for income.

The primary socio-economic impacts associated with the Project will be positive in that residents of the study area and the region will be offered employment opportunities during construction and operation.

11.2.1 TRAINING AND EDUCATION

Project development has the potential to provide increased availability and opportunity for a wide range of skills development and job training. Job opportunities made available could increase the health and well-being of families in general. These impacts will continue for the construction, operational, decommissioning and post closure phases of the project.

11.2.2 POPULATION INFLUX, INFLATION AND INCREASE IN CRIME

The social and economic pressures of population growth will continue as additional people move to the area to find employment and require accommodation and access to community services (particularly during construction).

11.2.3 GOVERNMENT REVENUE AND ROYALTIES

During the construction and operational phases of the project, payment of dividends, royalties, corporate tax, and income tax should also improve the financial capacity of the government to improve community infrastructure and service delivery.

[5] The survey has been attached as Annexure D.

11.3 HERITAGE

A heritage Impact Report was undertaken by HCAC (2019). A summary of the report is provided below and the complete report is provided in The EIR.

In terms of the built environment (Section 34 of the NHRA) nine ruins were recorded (KP 6, KP 9, KP 11, KP 12, KP 13, KP 15, KP 17, KP 21, KP 22). Apart from KP 11, 15 and 17 that will not be directly impacted on the other ruins are all located in the preferred plant and opencast area. Although these ruins' potential to contribute to aesthetic, historic, scientific and social aspects is low, if confirmed to be older than 60 years these features are protected by legislation and must be assessed by a conservation architect.

Archaeological remains are sparse throughout the study area and three sites (KP 1, 2 & 3) were recorded centred around pans. These sites consist of a scatter of Stone tools, possible rock art and a small shelter. Fortunately, these sites are within environmental buffer zones around the pans and will not be directly impacted on. An independent paleontological study (Millsteed 2019) found that it is evident that the proposed mining operations pose a risk of negatively impacting upon scientifically highly significant fossil assemblages and damage mitigation protocols are required. Detailed recommended control mitigation measures are included in Section 10 of the specialist report.

In terms of Section 36 of the Act six cemeteries (KP 4, KP 5, KP 7, KP 14, KP 16, KP 18) were recorded. Four of the cemeteries are located in the pit and wash plant area and will be directly impacted on (KP 4, 5, 7 and 18). Two of the cemeteries could be indirectly impacted on. It is recommended that these cemeteries should be retained in situ, with a 50 m buffer zone and demarcated with an access gate where possible. If this is not possible these cemeteries can be relocated adhering to legislation. More graves/ cemeteries can be expected in the mining right area and if any additional graves are identified they should ideally be preserved in-situ or alternatively relocated according to existing legislation.

No public monuments are located within or close to the study area. The study area is rural in character with an emphasis on agriculture with several mining operations next to the current study area and although it is not a significant cultural landscape the proposed mining can have a negative impact on the sense of place. During the public participation process conducted for the project no heritage concerns were raised.

The impact of the proposed project on heritage resources is considered low to medium and impacts can be mitigated to an acceptable level. The greatest risk to the project is the location of known and unknown graves.

11.4 NOISE

An environmental noise impact assessment was undertaken by Airshed Planning Professionals (2019). A summary of the report is provided below and the complete report is provided in EIR.

Blasting generates short duration events that are noticeable by communities and individuals living in the immediate environment. These events tend to be emotive because of structural response (resonance) mainly to air blast and are easily recognized as being related to blasting.

People living near the existing mining areas will already be familiar with the ground and air blast generated by surface blasting in the tree mining areas immediately surrounding the proposed Kranspan operation. The extension of mining in the area will therefore not create a new and unfamiliar stressor to them, except that people may already be sensitised and less tolerant especially of air blast. The significance of the noise impacts due to project activities were found to be low to medium during the construction and closure phases and medium to high during the operational phase. Assuming the adoption of good practice noise mitigation and management measures as recommended, the significance of project noise impacts may be reduced to low to medium during all project phases.

11.5 AIR QUALITY

An air quality impact assessment was undertaken by Airshed Planning Professionals (2019) as part of the Impact Assessment Process. A summary of the report is provided below.

The impacts due to the proposed Project were assessed with respect to location of the opencast areas relative to the closest receptors. Two options were assessed for the disposal of discard from the beneficiation plant, namely disposal via discard stockpile or via backfilling.

No significant differences were found with respect to the options for discard disposal. However, the proposed Project operations are projected to result in exceedances at the closest receptors (AQSRs #1, #5, #13 and #14, viz. informal housing located on-site, a nearby school and two farmsteads located within the project site boundary) even with design mitigation measures in place (water suppression on roads, dust suppression fitted on drill rigs, roofing and one side covering of the overland conveyor, and water sprays at materials handling points and crushers).

It is recommended that the two on-site farmsteads not be used for residential purposes at the time of commencement of Kranspan mining operations. It is also recommended that continuous PM10 and PM2.5 monitoring be conducted at the school and informal community from Year 3 onwards, to start an investigation into the impacts on these receptors well before nearby opencast mining occurs from Year 5 through Year 12. Should exceedances of the daily PM10 and/or PM2.5 NAAQS occur, the relocation of the school and/or informal community must be considered.

The proposed Project operations should not result in significant ground level concentrations or dustfall levels at the nearby receptors provided the design mitigation measures are applied effectively. From an air quality perspective, the proposed project can be authorised permitted the recommended mitigation and monitoring measures are applied.

11.6 VISUAL

The current visual landscape within and surrounding the proposed mining right area is a combination of agricultural fields, farm houses, natural grasslands and pans, road and powerline infrastructure as well as existing coal mining activities.

To provide an indication of the visual impact of the proposed Project, a basic viewshed analysis was undertaken for the infrastructure required to be established in support of the proposed mining activities.

Consistent with the precautionary principle, the infrastructure likely to have the highest visual intensity was identified and modelled at worst-case scenario heights as show in Table 11-2) below:

TABLE 11-2: INFRASTRUCTURE AND ASSOCIATED MODELLED HEIGHTS

INFRASTRUCTURE	MODELLED HEIGHT (WORST CASE SCENARIO)
Topsoil and Overburden Facilities	12 m
Secondary ROM Stockpiles & PCDs	
Product ROM Stockpile and Surface Discard Residue Deposit	5 m
Plant and Workshop	
Surface Discard Disposal Site	20 m

The viewshed output is shown in Appendix 2

The visual impact of an object in the landscape diminishes as the distance between the observer and the object increases. Therefore, the Potential Zone of Influence (PZI) [Oberholzer (2005)] is split into three zones (0 – 2.5 km, 2.5 – 5 km and 5 – 10 km) for determination of receptor impacts. Anything further than 10 km is generally considered to be very low to negligible visual impact, owing to the diminishing effect of distance and atmospheric conditions (haze).

The viewshed analysis results indicate that the natural Visual Absorption Capacity (in this case the topography) screens out the visual impact of the modelled infrastructure and mining from much of the western viewshed of the proposed mining right area as well as significant portions of the viewshed from the east, north and south of the proposed mining right area.

A summary of the visual impact, based on the viewshed analysis, is shown in Table 11-3 Below:

TABLE 11-3: RESULTS OF THE VIEWSHED ANALYSIS

PZI ZONE	ZONE AREA (HA)	VIEWSHED AREA (HA)	PERCENT COVERAGE	VISUAL EXPOSURE IMPACT	PROXIMITY IMPACT	TOTAL IMPACT
0-2.5 km	11 205	8 395	74.92%	High	High	High
2.5-5 km	11 754	3 486	29.66%	Medium - Low	Medium	Medium - Low
5-10 km	35 331	7 486	21.19%	Low	Low	Low
Full PZI	**58 290**	**19 366**	**33.22%**	**Low - medium**	**-**	**Low - medium**

The expected visual impact from the modelled infrastructures would be relativity similar to that of the current receiving environment. The area is already impacted by existing mines and the additional impact will be considered less significant.

The type of environment or sense of place for this area can defined as an area of low scenic, cultural or historical significance. This is owing to the significant existing mining activities taking place in the near and surrounding areas of the entire PZI (Oberholzer, 2005). The main receptors shown by the viewshed analysis to likely be impacted as a result of the change in viewshed are dynamic receptors (motorists) driving along the R36 from Carolina in the north to Breyten or Ermelo in the south (and vice versa).

The static viewers (residents) are generally located outside the 10 km PZI, with a minor portion of Silobela having a low impact at the edge of the 10 km PZI. Since the area is characterised by historical mining activities, there is already a visual impact on the area that has been in place for many years. This has also affected the sense of place to a more mining and industrial type.

11.7 COMMUNITY HEALTH AND SAFETY ASPECTS

11.7.1 HIV/AIDS

Mpumalanga is one of the three provinces with the highest HIV/AIDS infection rates, and the latest statistics for the Province indicate an increase in Gert Sibande District (IDP, 2018/2019). The incidence of HIV/AIDS and other Sexually Transmitted Diseases (STDs) could increase as a result of in-migration of workers seeking employment. Outbreaks of tuberculosis (TB) can be facilitated by crowded housing conditions and therefore pose a risk for both employees and community members. A similar situation is true for acute respiratory infections.

11.7.2 ROAD ACCIDENTS/SPILLS

Ilima will transport material and equipment to and from the site via the R36. The R36 serves as an important road network in the region providing access to different social and economic opportunities within the

Mpumalanga Province. Spills or accidents that may occur while transporting coal, chemicals and hydrocarbons from could have an impact on human health and the environment.

Traffic and congestion on local public roads will increase as Project development progresses. In summary, safety risks to vehicles and pedestrians will be increased.

11.7.3 BLAST OVERPRESSURE, VIBRATION AND FLYROCK

There are five sources of risk from blasting

1. Vibration impact on houses, farm buildings, roads, dams and boreholes
2. Fly rock impact on all structures, people and livestock
3. Air blast impact on houses, people and livestock
4. Poisonous fumes impact on people and livestock
5. Nitrates from explosives storage and use dissolving into the water systems

TABLE 11-4: LIST OF SENSITIVE RECEPTORS AROUND THE OPENCAST MINING AREA

Map ID	Description	Owner/Farm	Distance to deep mining (m)	Distance to shallow mining (m)
A	Farmstead	Jugtlust 47(Baadtjiesbult Boerdery Pty Ltd)	2432	
B	Farm buildings	Naudesbank 172	3209	
C	Farmstead and farm buildings	Naudesbank 172	3887	
D	Farm buildings	Naudesbank 172 (Kleyn Gysbert Samuel)	1470	
E	Farm workers houses	Naudesbank 172 (Kleyn Gysbert Samuel)	1872	
F	Farm workers houses	Naudesbank 172 (Kleyn Gysbert Samuel)	2608	
G	Farm buildings	Naudesbank 172 (Kleyn Gysbert Samuel)	1829	
H	Farmstead and farm buildings	Witbank 209 (CMJ Papenfuss Trust)	2205	
I	Farmstead and farm buildings	Vaalbank 212 (Roodeblom Trust)	1913	
J	Farmstead	Kromkrans 208	6075	
K	Farm workers houses	Vaalbank 212 (Moolman Martha Johanna)	2919	
L	Farm workers houses	Witbank 82	3587	2075
M	Buildings	Witbank 82	3301	2085
N	Farm buildings	Witrand 52	3804	2459
O	Buildings	Witrand 52	5164	4026
P	Farmstead and farm buildings	Goedehoop 45	5776	
Q	Farmstead and farm buildings	Goedehoop 45	5930	
R	Farm workers houses	Goedehoop 45	5358	
S	Farmstead and farm buildings	Jagtlust 47	3736	
T	Derelict buildings	Kranspan 49 (Roodebloem Trust)	24	
U	Farmstead and farm buildings	Kranspan 49 (CMJ Papenfus Trust)	425	
V	Farmstead	Smutsoog 214	4717	3474
W	Farmstead and farm buildings	Smutsoog 214	4915	3666
X	Buildings	Jugtlust 47	1526	

1	Surface mine	Msobo Coal Pty Ltd	1261	
2	Surface mine	Jugtlust (Baadtjiesbult Boerdery Pty Ltd)	365	
3	Surface mine	Witbank 82	6933	5391
4	Earth dam	Jugtlust 47	2974	
5	Earth dam	Witrand 52	2980	1435
6	Longview railway siding	Witbank 82	2713	1482
7	Albion railway siding	Witbank 82	4098	2550

The R36 road runs through the mining property with surface blasting coming to within 150 m of the tarred surface in two areas. Before mitigation, vibration amplitudes when blasting closer than 200 m from the road will increase the risk of damage to the surface through desegregation. The unmitigated significance rating for the road at two points within the mine property is Medium low.

With the mitigation measures outlined in section 12 of the specialist report, the significance ratings for both receptors (road and the buildings on the farm Kranspan 49) is reduced to Low significance and blasting can occur at minimum distances of 150 m from the R36 road and 650 m from the buildings on the farm Kranspan 49.

Wells (boreholes) will only be impacted in mitigated and unmitigated blasting to control vibration when they are closer than 100 m from blasting. Therefore, blasting will have no significant impact on boreholes and aquifers outside this range.

Fly rock in unmitigated blasting can be ejected to large distances from a blast, with a typical maximum of 1000 m. In mitigated conditions, this can reduce significantly to within a few hundred metres of blasting.

For unmitigated blasting, the impact significance is Medium High but can be brought down to a Low impact significance of 42 by applying the mitigation measures for controlling fly rock when blasting occurs closer than 1000 m from any receptors.

The receptors that are negatively impacted by unmitigated blasting has been identified in the specialist report and include a portion of the railway line to the south east of the mine, The R36 that runs close to the blasting activity and the mining activity to the northwest and northeast of the operation (markers 1 and 2 of the specialist report).

Air blast presents the highest risk of complaints from neighbours. In unmitigated blasting, the significance will be high because of the large special scale. However, if stemming and timing is effectively controlled as described in the mitigation measures on page 21, the significance drops to a low value of 49.

TABLE 11-5: ASSESSMENT OF SOCIAL IMPACTS[6]

Impact	Project Phase	Impact Description	Significance Pre-Mitigation	Significance Post Mitigation
Local employment	All Phases	The proposed development will ensure that the current 350 Ilima employees will remain employed instead of retrenchments having to be implemented due to current operational mine closures. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever practicable will increase the significance of this positive impact.	Medium-High'+'	High'+'
Local economic development	All Phases	Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the agreed LED projects committed to in the SLP will have a significant positive impact for the broader community.	Medium-High'+'	Medium-High'+'
Training and development	All Phases	Implementation of the HRD programme, as described in the SLP is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy for employees and in the wider community.	Medium-High'+'	High'+'
Loss of common property	Construction, Operational	Parts of the proposed mining area are currently used for commercial agriculture. During the operational phase, less agricultural product will be available from Kranspan. This impact is however likely to be temporary as the land may be returned to agriculture after rehabilitation has been completed. The loss of agricultural product from Kranspan, relative to the size of the local market, is also considered to be insignificant and the temporary impact is thus not deemed to be a risk to food security either locally or regionally;	Medium-High'-'	Low-Medium'-'

[6] The impacts identified in the specialist reports pertaining to land use, heritage, noise and air quality has not been repeated in the impacts table

Influx of job seekers – demand on municipal services	Construction and Operational	An influx of people seeking employment can be expected during the construction phase especially. This will place additional demand on municipal services in the proposed project area, such as public safety, health care, water, sanitation, and housing. The impact can be mitigated through cooperative planning with the local municipality.	Medium-High'-'	Low-Medium'-'
Mine health and safety	All Phases	Minor, major and fatal injuries from potential mine health and safety incidents. There are multiple health and safety risks associated with surface and underground mining, ore processing and movement of man and materials. In addition, the mine will store and handle various hazardous substances including explosives. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of an incident, which may include loss of life. Implementation of a comprehensive health and safety management programme and adherence to legislation governing mine health and safety requirements will mitigate this impact.	High'-'	Low-Medium'-'
Security risk	Construction and Operational	Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities. The pre-mitigation impact significance rating is Medium-High because of the potential human health consequences of a crime. The post-mitigation impact significance rating is Low-Medium due to the ability to prevent these impacts through the implementation of security measures.	Medium-High'-'	Low-Medium'-'
Contribution of royalties, rates and taxes	Operational	The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the payment of rates and taxes to the CALLM. This is considered to be a positive impact of Low-Medium significance.	Low-Medium'+'	Low-Medium'+'
Community health and safety	All Phases	Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of a community safety incident, which may include loss of life. The post-mitigation impact significance rating is Low due to the ability to prevent these impacts through adherence to the relevant legal requirements on mine health and safety and the mitigation measures in the EMPr.	High'-'	Low'-'

Mine closure and associated effects on local economy	Decommissioning and Closure	Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme.	Medium-High'-'	Low-Medium'-'
Disturbance/Loss/Sterilisation of Inherent Land Capability and Land Use	Construction and operational	Acquisition of the surface rights by the Applicant may cause a temporary economic displacement of farm workers if they are unable to be employed by the mine or find alternative employment on nearby farms. It is likely that a number of traditional medicinal plants occur in the project area. Due to health and safety concerns if mining commences, these medicinal plants may not be accessed as freely.	Medium-High'-'	Low'-'
Community health and safety	Construction and operational	An influx of people seeking employment can be expected during the construction phase especially. This may lead to an increase in HIV/AIDS and other Sexually Transmitted Infections.	Medium-High'-'	Low'-'

12 MITIGATION MEASURES

Recommended mitigation measures for preventing and/or reducing the significance of the potential impacts of the development on the social environment are provided hereunder. These mitigation measures are to be included in the Environmental Management Programme (EMPr) and compliance therewith should be included as a condition to the environmental authorisation:

- The Applicant must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes;
- The SLP and EMPr, including all management and monitoring measures must be implemented and compliance thereto audited by a competent independent person on an annual basis;
- The following social management plans and procedures must be developed by the Applicant prior to construction commencing:
  - An emergency preparedness and response plan;
  - A comprehensive mine health and safety management plan, incorporating controls for ensuring community health and safety;
  - An influx management plan developed in collaboration with the CALLM. The plan must identify responsibilities between the Applicant and the CALLM, for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in the local area;
  - A compensation policy and framework outlining the procedure to be followed for the compensation of any losses confirmed to be as a result of the activities of the mine; and
  - A written complaints and grievance procedure.
- The Applicant must establish a community engagement forum comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local business;
- All relevant monitoring data with respect to air quality and groundwater must be made available to the community engagement forum;
- The Project should encourage and invest in alternative livelihoods development so that at decommissioning and closure phases, the local area is not reliant exclusively on the Project for employment and economic opportunities;
- Work closely with local health services in monitoring and addressing changes in levels of community health and wellbeing;
- Implement an HIV/AIDS awareness programme addressing factual health issues as well as behaviour change.
- An annual report on the progress of implementation of the programmes and commitments made by the Applicant in the mine social and labour plan should be provided to the community engagement forum, steering committee and all other relevant stakeholders. It is recommended that the report include feedback on relevant socio-economic indicators, to be agreed by the forum, and which may include indicators such as:
  - Local employment;
  - Business opportunities;

- Crime and safety;
- Housing supply and suitability;
- Housing affordability;
- Influx management;
- Income distribution;
- Skills development, training and development; and
- Transport and traffic.
- Suggested mitigation measures to reduce the areas of high visual impact, include the following:

- Planting a line of trees or vegetation (done in collaboration with a local botanist / specialist to prevent planting of non-indigenous trees) to act as a line of sight barrier.
- Maintain the height of the stockpiles as low as possible and consider revegetation of the stockpiles (topsoil, overburden etc.) to soften the visual contrast of these facilities.
- Establish a lighting plan to minimise light pollution.

13 IMPACT STATEMENT

Key findings of the social impact assessment for the proposed mine development on the Farm Kranspan are as follows:

- The proposed development will result in a change to the current socio-economic environment. This change will result in several positive and negative impacts;
- The proposed development has the potential to create employment and economic development opportunities for local communities during the construction and operational phases of the mine;
- The mine SLP has provided costed plans for optimising local employment, skills development and a commitment to implementing local economic development projects, identified in collaboration with the CALLM;
- Several negative social impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated;
- Provided that the mitigation measures in this report and the measures in the mine SLP are implemented, it is the opinion of the EAP that the authorisation may be granted; and
- Compliance with the mitigation measures in this report should be included as conditions of the environmental authorisation.

Provided that the mitigation measures in this report and the measures in the mine social and labour plan are implemented, it is the opinion of the EAP that the authorisation may be granted.

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2018]

APPENDIX 1: SPECIALIST CVS

CURRICULUM VITAE

CHANÉ PRETORIUS

ENVIRONMENTAL CONSULTANT

BACKGROUND

Chané is an Environmental Consultant at ABS Africa.

She has over 6 years' experience in coordinating and managing various environmental studies in the mining, infrastructure and energy sectors.

Her key experience includes the management and compilation of local and international Environmental and Social Impact Assessments, in compliance with in-country and international standards. She has undertaken projects in South Africa, Zimbabwe, DRC, Mozambique, Mali and Ghana.

FIELDS OF COMPETENCE

- Environmental and Social Impact Assessments
- Environmental Auditing
- Project Management
- Fatal Flaw Assessments
- Pre-feasibility Assessments
- Environmental Due Diligence
- Basic Assessment Reports (BARs)
- Environmental Management Programmes (EMPr) and Action Plans
- Legal Registers

ACADEMIC QUALIFICATIONS

- Bachelor of Science in Tourism, Zoology and Geography: North West University, 2010
- Bachelor of Science (Honours) in Geography: University of Johannesburg, 2011

COURSES COMPLETED

- Environmental Law for Environmental Managers, North West University, 2015.
- Water Management in Mining, University of the Free State, 2014.
- Mining Closure and Rehabilitation, North West University, 2013.

KEY PROJECT EXPERIENCE

KRANSPAN PROJECT – SOUTH AFRICA (2018 - PRESENT)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and integrated water use licence for a proposed surface and underground coal mine, near Carolina in the Mpumalanga Province.

NORTHERN CAPE PROSPECTING – SOUTH AFRICA (2018 - PRESENT)

Environmental Assessment Practitioner for three environmental authorisation processes in support of prospecting right applications, near Copperton and Marydale in the Northern Cape Province.

MUKULU MANGANESE PROJECT- SOUTH AFRICA (2019)

Environmental review and audit in terms of the requirement of the environmental authorisation and environmental management plan as well as associated closure plan.

PRIESKA ZINC COPPER PROJECT – SOUTH AFRICA (2017-2018)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and integrated water use licence for the proposed re-establishment of the Prieska Copper Mine, near Copperton in the Northern Cape Province.

Prieska Zinc Copper Project (Vardocube Section)– South Africa (2018)

Environmental Assessment Practitioner for an environmental authorisation for the proposed re-establishment of the Prieska Copper Mine (underground), near Copperton in the Northern Cape Province.

Hlagisa Wildfontein Mine Expansion Project – 2018

Environmental Assessment Practitioner for a Section 102 amendment for the expansion of the Wildfontein Mine.

Hlagisa Wildfontein Mine IWWMP

Environmental Assessment Practitioner responsible for the compilation of an Integrated Water and Waste Management Plan for the Wildfontein Colliery.

Glenover Mine Project – (2017)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and integrated water use licence for the proposed Glenover Mine.

Lenasia South Hospital Project – South Africa (2016)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and atmospheric emission license for the conversion of a community health centre into a Level 1 District Hospital.

Springs Fresh Produce Market Expansion Project – South Africa (2016-2017)

Environmental Assessment Practitioner for an environmental authorisation for the expansion of the Springs Fresh Produce Market.

Kalana Gold Project – Mali (2015-2016)

Environmental Assessment Practitioner for an IFC-compliant ESIA and RAP for a proposed gold mine and processing plant. The Project included management of various specialist sub-consultants and a local consultant responsible for the social studies as well as assistance with the completion of a Resettlement Action Plan (RAP).

Esaase Gold Mine Project - Ghana (2013 – 2014)

Assistance with the project coordination of an EIA for a greenfield gold mine in Ghana. The Project included management of various specialist studies and coordination of the public participation process and social impact assessment. An online project legal register was developed.

Hwange Power Station - Zimbabwe (2013 – 2014)

Project management of the comprehensive environmental and social audit of the Hwange Power Station. The audit assessed compliance of the power station to both in-country legal requirements and the IFC performance standards. Studies were coordinated between experts in Australia, South Africa and Zimbabwe. A prioritized management plan was compiled with recommendations to address the findings of the audit.

Fekola Gold Project - Mali (2013)

Project assistance with the completion of an IFC-compliant ESIA for a proposed gold mine and processing plant.

Estima Coal Project -Mozambique (2013)

Assisted with the fatal flaw analysis for the proposed Chitima Northern Conveyor Line.

Environmental Impact Assessment for the Kusile 60 Year Ash Disposal Facility - Mpumalanga, South Africa (2012)

Project coordination of an EIA for an ash disposal facility including management of specialist studies, report compilation and assistance with public participation. A desktop site selection study was undertaken as part of the EIA.

Renewable Energy Guideline - South Africa (2012)

Compilation of a guideline document for the Renewable Energy Sector on the listed activities in the Environmental Impact Assessment Regulations published under the National Environmental Management Act 107 of 1998.

Wilge / Phola Sewer And Water Pipeline Development Project – Mpumalanga, South Africa (2012)

Conducting the water use license application (WULA) process for Section 21 (c) and (i) water uses, including compilation of all DWA application forms and assisting with compilation of the technical report.

Solar Park Integration Project - Northern Cape, South Africa (2012)

Coordination and compilation of three Basic Assessment Reports (BAR) and associated EMPr for the Solar Park Integration Project consisting of:

- 3 x 132kV lines and 2 x 20MVA Transformers for the Solar Park Site
- 3 x 132kV lines for the independent power producers in Solar Park
- 5 x 132kV lines for Solar Park
- 2 x (±) 25km 132kV lines to Gordonia Substation (Upington)

Medupi Power Station OEMP – Limpopo, South Africa (2012)

Compilation of an Operational Environmental Management Plan for the Medupi Power Station.

APPENDIX 2: CUMULATIVE VIEWSHED