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Environmental Authorisation for the Klipspruit Extension: Weltevreden

Environmental Noise Impact Assessment Report

Project Number:

BHP2690

Prepared for:

BHP Billiton (Pty) Ltd

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EXECUTIVE SUMMARY

BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA) is the holder of an approved Mining Right (Ref No. MP 30/5/1/2/2/125 MR) and Environmental Management Programme (EMP) for Klipspruit Colliery (KPS), located near Ogies, Mpumalanga Province. The Klipspruit EMP was approved in 2003 in terms of Section 39 of the Minerals Act, 1991 (Act No. 50 of 1991) and in 2009 was subsequently updated to meet the requirements of the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA).

BECSA is proposing to extend the Life of Mine (LoM) of its operation by implementing the Klipspruit Extension (KPSX) Project which incorporates Klipspruit South (KPSX: South), as well as the Weltevreden project. The Mining Right for KPS incorporates the Klipspruit Main Pit, the Smaldeel Mini-pit, Bankfontein project, and KPSX: South sections.

Digby Wells Environmental (Digby Wells) has been appointed by BECSA as the independent Environmental Assessment Practitioner (EAP) to conduct an Environmental Impact Assessment (EIA) and the associated specialist studies for the proposed opencast mining operation for its KPSX: Weltevreden Project.

This report relates specifically to the expected noise impacts of the proposed mining activities on the ambient noise climate of the area, which is rural to the north and east and urban residential and light commercial to the south and south. The approach used in investigating the noise impacts is based on the National Noise Control Regulations in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989).

This environmental noise impact assessment report forms part of the EIA/EMP report and entails the following tasks:

- Identification of noise sources and potential noise sensitive receptors;
- Establishment of the existing noise climate at various locations in the project area and directly adjacent areas through the undertaking of baseline noise measurements; and
- Assessment of the anticipated noise impacts associated with the project activities during the construction, operational, decommissioning and post-closure phases.

In terms of the baseline conditions, it is gathered that the existing ambient noise levels in the immediate area are typical of rural districts, with the average daytime levels measuring at 45dBA, which is similar to the SANS rural daytime guidelines. The average baseline night time levels are 38dBA which is slightly above the SANS rural night time guidelines. This was due to higher levels measured at two of the locations that were in close proximity to the railway line and R555 provincial road.

From the study, it is concluded by means of dispersion modelling that the noise produced by the proposed project at the location of identified receptors will not measure above the existing baseline noise levels as well as not measure above the SANS day and night time

guideline rating limit at the surrounding urban or rural areas. The overall significance rating of the noise impact is low.

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1 Introduction

BHP Billiton Energy Coal South Africa (Pty) Limited (BECSA) is the holder of an approved Mining Right (Ref No. MP 30/5/1/2/2/125 MR) and Environmental Management Programme (EMP) for Klipspruit Colliery (KPS), located near Ogies, Mpumalanga Province. The KPS EMP was approved in 2003 in terms of Section 39 of the Minerals Act, 1991 (Act No. 50 of 1991) and in 2009 was subsequently updated to meet the requirements of the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA).

BECSA is proposing to extend the Life of Mine (LoM) of its operations by implementing the Klipspruit Extension (KPSX) Project which incorporates Klipspruit South (KPSX: South), as well as BECSA's three neighbouring Prospecting Rights to the north east, collectively referred to as Weltevreden (KPSX: Weltevreden). KPSX: Weltevreden has a coal reserve of approximately 600 million tonnes and will extend the KPS LoM by at least another twenty (20) years.

Digby Wells Environmental (Digby Wells) has been appointed by BECSA as the independent Environmental Assessment Practitioner (EAP) to conduct an Environmental Impact Assessment (EIA) in terms of the NEMA, as well as the associated specialist studies for the proposed opencast mining operation for its KPSX: Weltevreden Project.

2 Terms of Reference

This report relates specifically to the noise impacts of the proposed opencast KPSX: Weltevreden Project on the ambient noise climate of the area, which is rural to the north, east and west and urban residential and light commercial to the south south west, with numerous operational coal mines in the surrounding area as well. The approach used in investigating the noise impacts is based on the National Noise Control Regulations, R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989). The following additional legislation and standards were also considered during the assessment:

- The National Environmental Management Act (Act 107 of 1998), NEMA;
- The National Environmental Management Air Quality Act (Act 39 of 2004), NEMAQA; and
- The South African National Standards SANS 10103:2008 "The measurement and rating of environmental noise with respect to annoyance and to speech communication" (SANS 10103:2008).

The Environmental Noise Impact Assessment Report includes a baseline assessment and predicted noise impacts on the identified noise sensitive receptors by use of noise dispersion modelling as well as recommendations and mitigation measures for potential impacts.

3 Study Area

The KPSX: Weltevreden Project area is 7 353.9 ha in size and is located to the east and north of the town of Ogies, as well as east of the settlement of Phola. The N12 national road transects the southern third of the Project site. The KPS operations are located towards the southwest of KPSX: Weltevreden, with the northeast of KPS sharing the Project boundary, alongside the N12 (refer to Plan 1).

4 Expertise of the Specialist

A curriculum vitae (CV) and declaration of independence is attached in Appendix A.

5 Aims and Objectives

The objective of the study is to assess what the current ambient noise levels are in the area as well as what the significance of the noise impact from the proposed project will be on the surrounding area. The study will comprise of baseline noise measurements to establish the soundscape of the area surrounding the proposed project as well as assess, via predictive noise dispersion modelling, the potential impact of the noise emissions from the proposed opencast mining activities on the surrounding environment.

6 Methodology

The approach used in investigating noise impacts is based on the national noise control regulations as published under R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) as well as guidelines provided by SANS 10103:2008. According to the SANS 10103:2008 “The measurement and rating of environmental noise with respect to annoyance and to speech communication”, the sound pressure level is used as the measurement unit for noise levels. The acceptable rating levels according to SANS 10103:2008 for ambient noise in different districts (residential and non-residential) are presented in Table 6-1.

Table 6-1: Acceptable rating levels for noise in districts (SANS 10103, 2008)

Type of District	Equivalent continuous rating level ($L_{Reg,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25

Type of District	Equivalent continuous rating level ($L_{Req,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON-RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.						
NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7						
NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.						
NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, $L_{Req,d} = L_{Req,n} = 70$ dBA can be considered as typical and normal.						
NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.						
NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Weighted sound pressure level of 50 dBA at a distance of 15 m from each individual source.						
a The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections						

Type of District	Equivalent continuous rating level ($L_{Req,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
for tonal character and impulsiveness of the noise and the time of day.						
b The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.						

The probable community/group response to levels in excess of the acceptable rating levels are presented in Table 6-2, where $L_{Req,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels (dBA), determined over a specific time period. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Table 6-2: Categories of community/group response (SANS 10103, 2008)

Excess ($\Delta L_{Req,T}$) ^a dBA	Estimated community/group response	
	Category	Description
0 – 10	Little	Sporadic complaints
5 – 15	Medium	Widespread complaints
10 - 20	Strong	Threats of action
>15	Very strong	Vigorous action
NOTE Overlapping ranges for the excess values are given because a spread in the community reaction might be anticipated.		
a $\Delta L_{Req,T}$ should be calculated from the appropriate of the following:		
1) $\Delta L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS $L_{Req,T}$ of the residual noise (determined in the absence of the specific noise under investigation);		
2) $\Delta L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the maximum rating level for the ambient noise given in table 1;		
3) $\Delta L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicable district as determined from table 2; or		

Excess ($\Delta L_{Req,T}$) ^a dBA	Estimated community/group response	
	Category	Description
4) $\Delta L_{Req,T}$ = Expected increase in $L_{Req,T}$ of ambient noise in an area because of a proposed development under investigation.		

A baseline assessment was undertaken to determine the current ambient noise level at the nearest noise sensitive receptor to the proposed project. The criteria that were used for the siting of the measurement location were:

- The location of the nearest rural as well as residential communities to the proposed KPSX:Weltevreden Project and subsequently the most likely to be impacted on by the proposed mining activities; and
- That serves as a suitable reference point for the measurement of ambient sound levels surrounding the proposed project area. The noise measurement locations cover four locations surrounding the project area (N1 – N4).

A Cirrus, Optimus Green, precision integrating sound level meter was used for the measurements. The instrument was field calibrated with a Cirrus, sound level calibrator. The baseline location is presented in Table 6-3 as well as on Plan 1 below. Photographs of the measurement locations are presented in Figure 6-1 to Figure 6-4.

Table 6-3: Noise measurement location

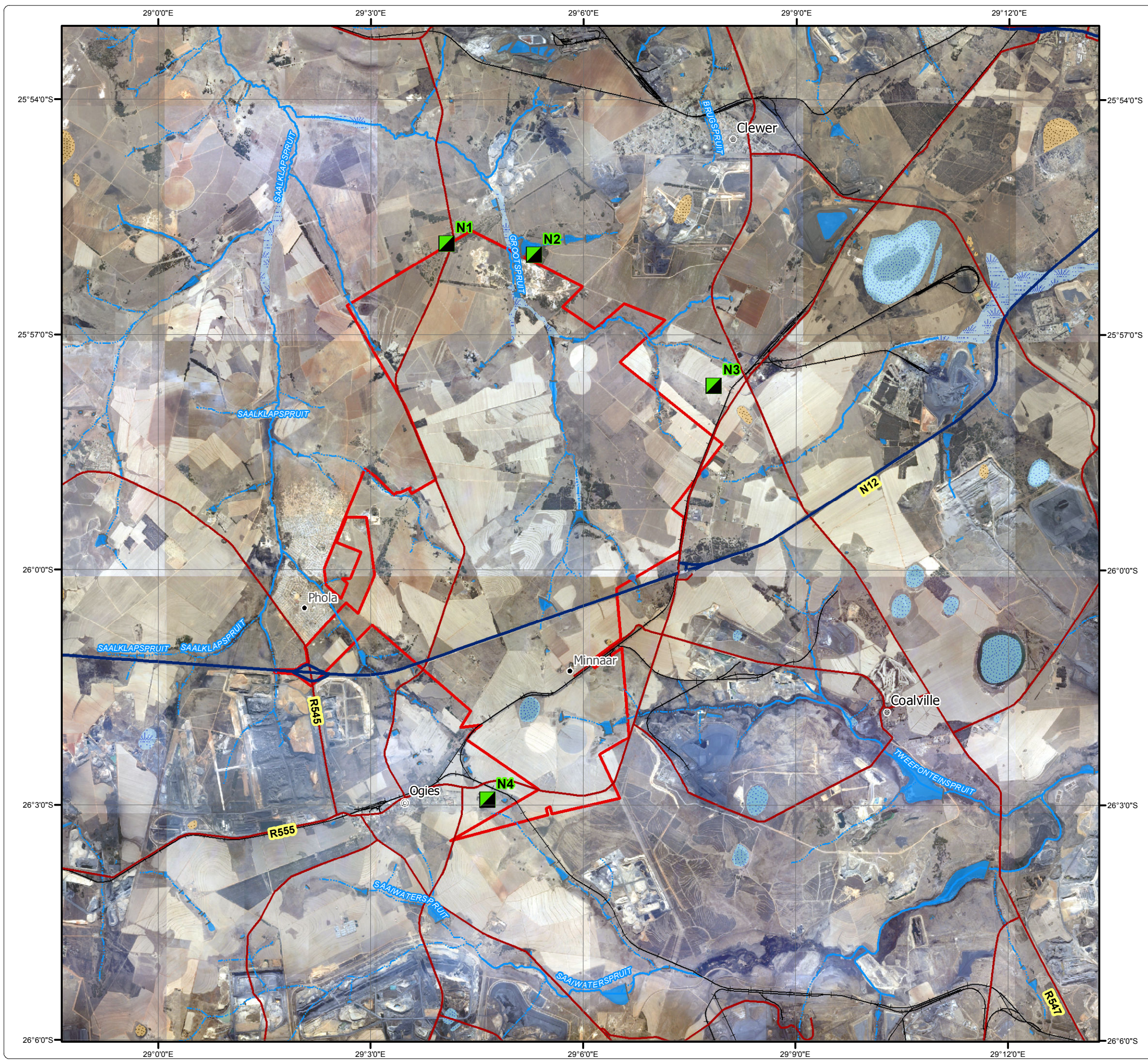
Site ID	Location	Category of receiver	GPS coordinates
N1	Portion 15 of Hartbeestlaagte 325 JS	Rural residential	25°55'50.03"S & 29°4'4.16"E
N2	Portion 2 of Elandsfontein 309 JS	Rural residential	25°55'58.60"S & 29°5'18.03"E
N3	Portion RE of Weltevreden 324 JS	Rural residential	25°57'38.55"S & 29°7'50.12"E
N4	Portion 39 of Grootpan 7 IS	Rural residential	26°2'55.64"S & 29°4'38.95"E

KPSX Weltevreden

Noise Measurement Location

Legend

- Project Area
- N Noise Measurement Locations
- Secondary Town
- Other Town
- Settlement
- Arterial / National Route
- Main Road
- Railway Line
- Dam Wall
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland



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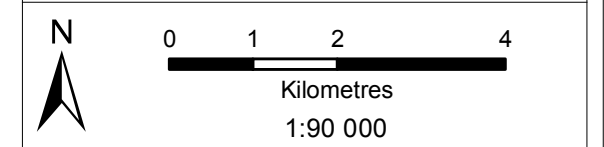




Figure 6-1: Measurement location N1 (rural receptor)



Figure 6-2: Measurement location N2 (rural receptor)



Figure 6-3: Measurement location N3 (rural receptor)



Figure 6-4: Measurement location N4 (rural receptor)

Predictive modelling was performed for the proposed opencast mining activities through the use of the modelling software SoundPlan. The software specializes in computer simulations of noise pollution dispersion. Estimates of the cumulative mining noise levels from the study were derived from the noise emissions from all the major noise-generating components and activities of the proposed project.

The following table indicates the noise power levels used in the model simulations. The sound power levels were derived from a number of previous studies.

Table 6-4: Sound power levels from main noise causing sources

Noise source	Sound power levels dB						
	<i>Octave band frequencies</i>	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz
<u>Construction phase</u>							
Haul Truck	108	118	115	114	110	106	102
Excavators	113	117	107	108	106	101	95
Front end Loader	108	116	107	108	105	99	95
Dozer	110	122	113	114	110	108	104
<u>Operational phase</u>							
Haul Truck	108	118	115	114	110	106	102
Shovel	105	117	113	114	111	107	101

The noise dispersion modelling software was used to assess whether the noise from the proposed opencast mining activities will impact on the relevant noise sensitive receivers, by comparing the predicted propagating noise levels with the current ambient baseline noise levels.

According to the National Noise Control Regulations "disturbing noise" means a noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more. The measured ambient sound level is described in Section 7.1 and the results of the noise dispersion modelling are presented in Section 7.2.

When comparing the measured ambient sound pressure level with the modelled noise levels and you want to know the combined sound pressure level to assess the cumulative noise level, the sound levels must be added together. However, due to the fact that the dBs' are logarithmic values they cannot just simply be added together.

If, for example, two sources are at the same sound pressure level, the most the sound pressure level will increase by is 3 dBs. The greater the difference in the two levels the lesser the increase to the noisier sound pressure level. If the difference between the two sound pressure levels is more than 10 dB the contribution from the quietest source can be disregarded.

7 Assessment Results

7.1 Baseline Results

The results from the noise meter recordings for all the sampled points as well as the rating limits according to the SANS 10103:2008 guidelines are presented in Table 7-1. The noise level time history graphs per noise measurement location can be seen in Figure 7-1 to Figure 7-3.

Table 7-1: Results of the baseline noise measurements

Sample ID	SANS 10103:2008 rating limit					
	Type of district	Period	Acceptable rating level dBA	L _{Aeq,T} dBA	Maximum/Minimum dBA	Date
N1	Rural	Daytime	45	42	81 / 21	24/06/2014
		Night time	35	32	61 / 27	24/06/2014
N2	Rural	Daytime	45	41	70 / 26	25/06/2014
		Night time	35	33	59 / 27	25/07/2014
N3	Rural	Daytime	45	47	74 / 27	23/06/2014
		Night time	35	41	65 / 27	23/06/2014
N4	Rural	Daytime	45	49	86 / 32	26/06/2014
		Night time	35	44	64 / 27	26/07/2014
	Indicates current L _{Aeq,T} levels above either the daytime rating limit or the night time rating limit					

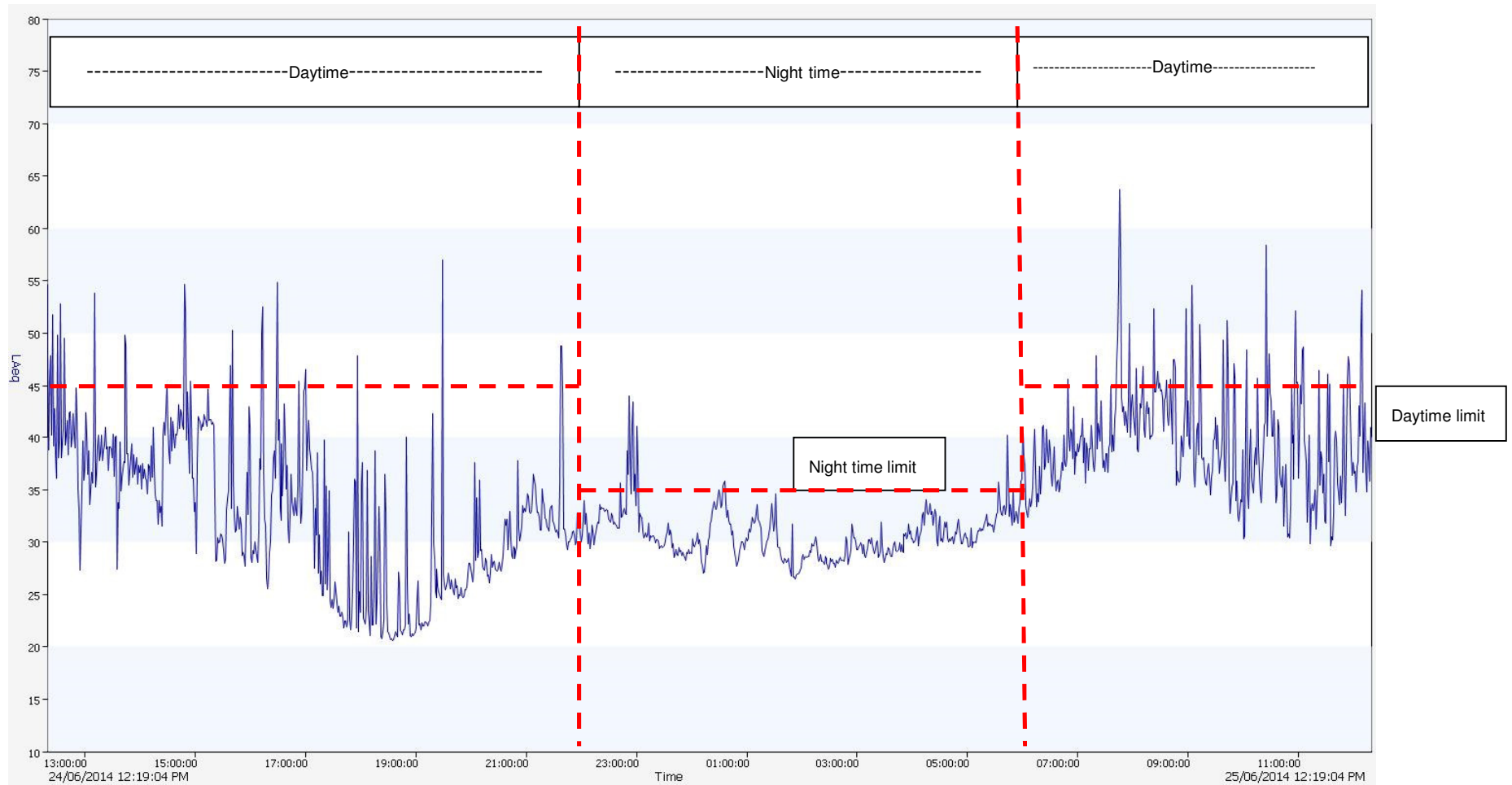


Figure 7-1: Noise time history graph for receptor N1

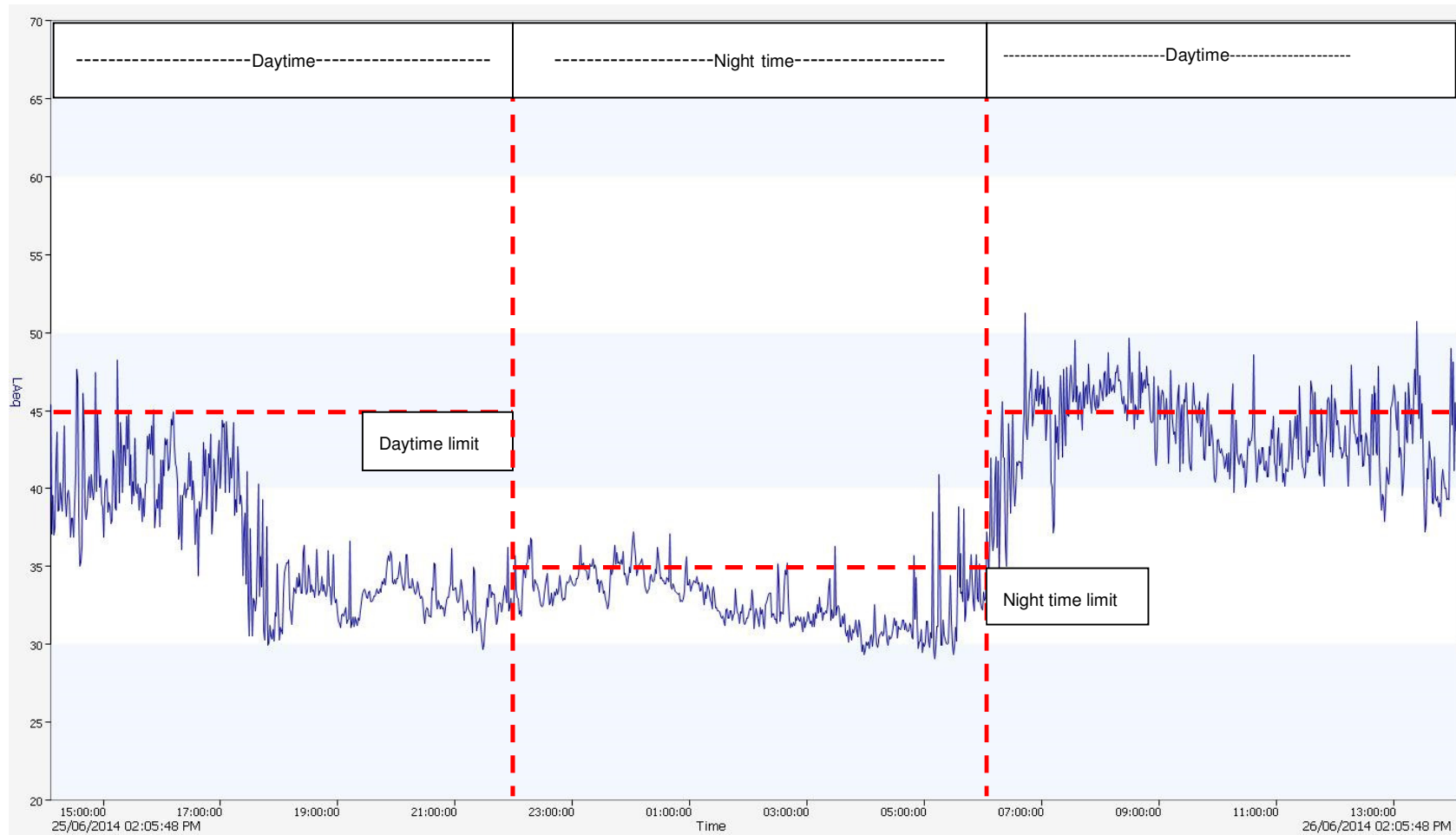


Figure 7-2: Daytime noise time history graph for receptor N2

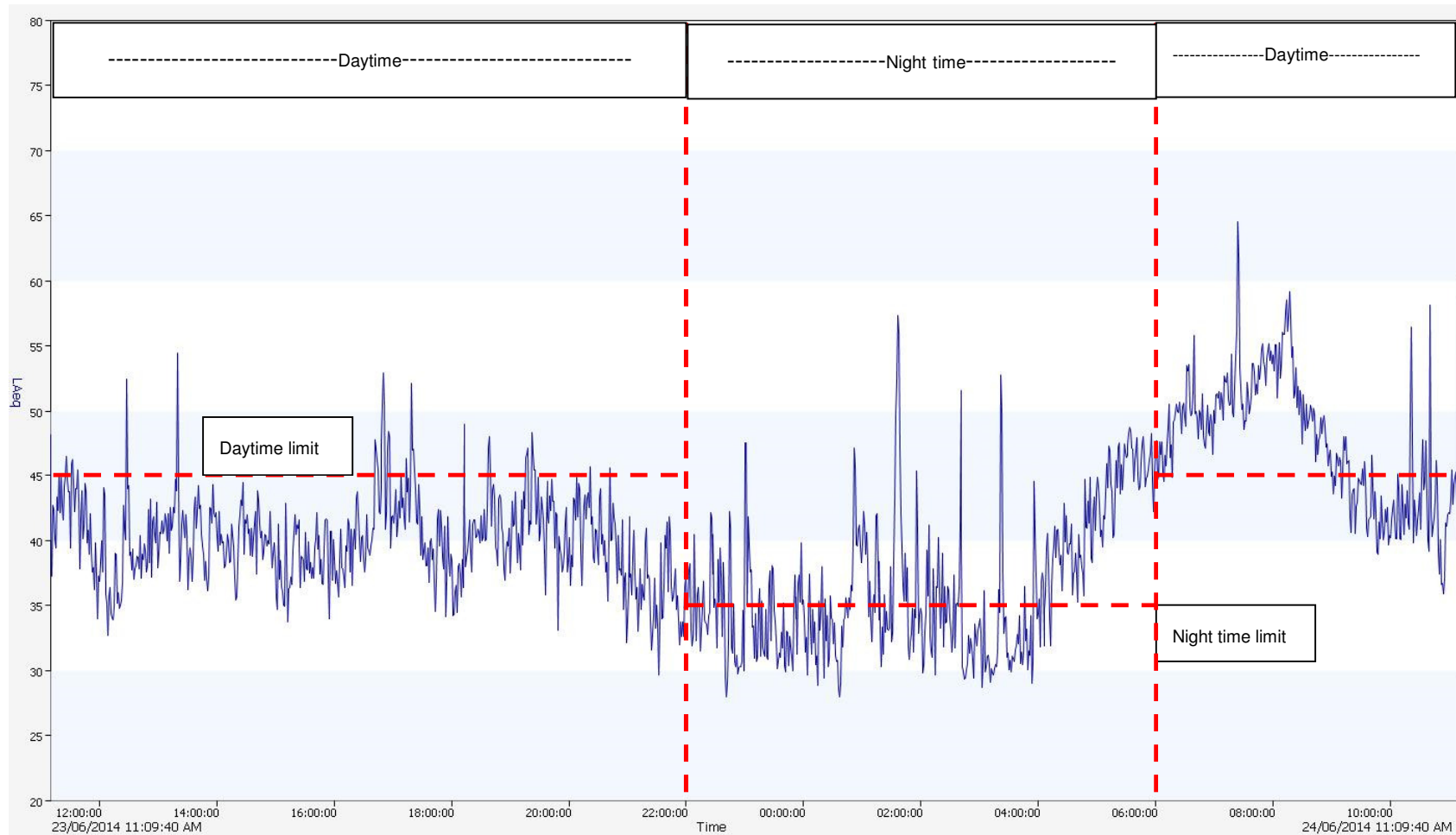


Figure 7-3: Night time noise time history graph for receptor N3

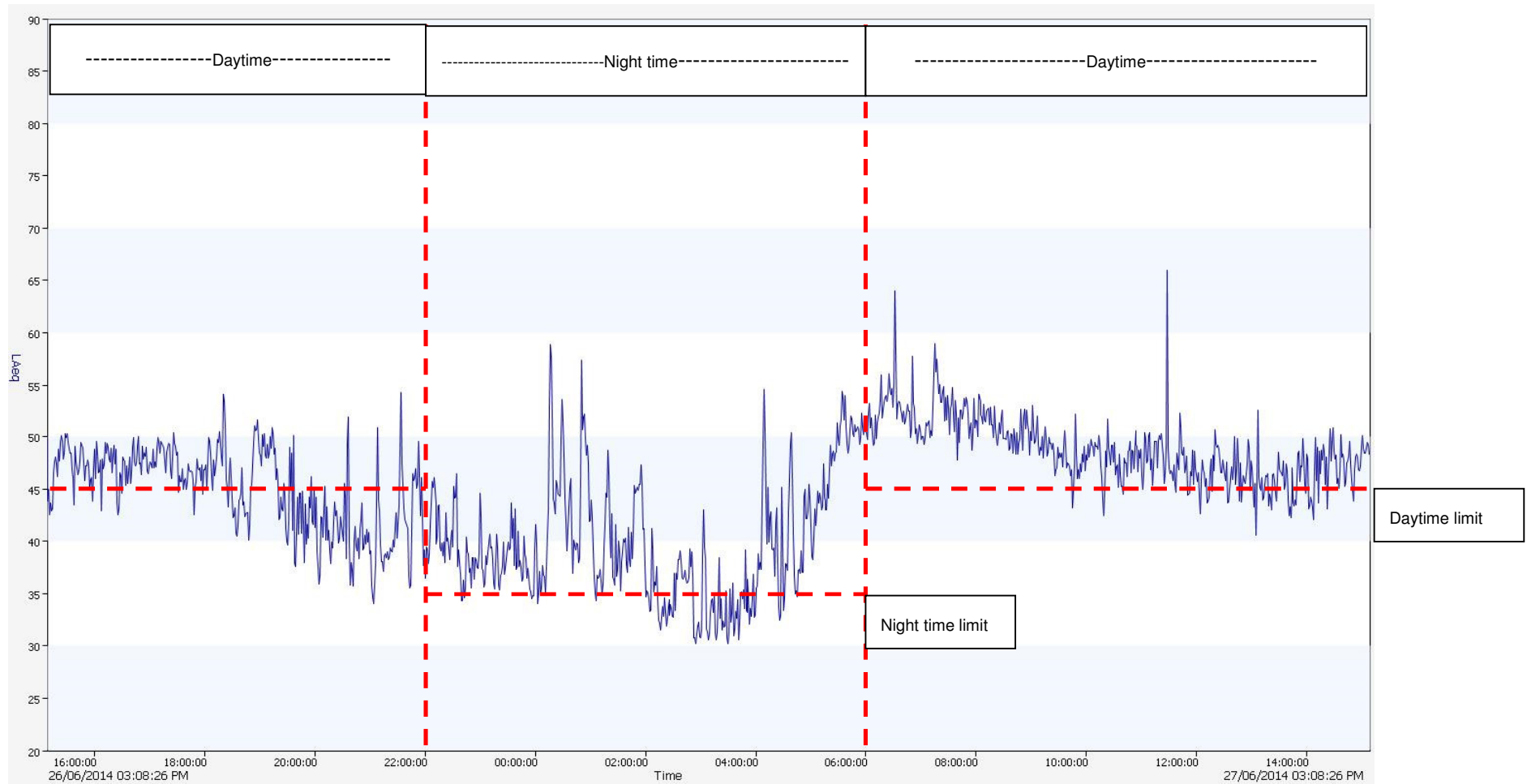


Figure 7-4: Noise time history graph for receptor N4

7.1.1 Daytime Results

Based on the daytime results, the existing ambient noise levels are below the SANS rating levels for the maximum allowable outdoor daytime limit (45dBA) for ambient noise in rural districts at N1 and N2. The ambient noise levels are however, above the limit at N3 and N4. The main contributing noise sources causing the higher levels at N3 and N4 are the vehicle traffic on the R555 as well as the railway noise.

7.1.2 Night Time Results

Based on the night time results, the existing ambient noise levels are below the SANS rating levels for the maximum allowable outdoor night time limit (35 dBA) for ambient noise in rural districts at N1 and N2. The ambient noise levels are however, above the limit at N3 and N4. The main contributing noise sources causing the higher levels at N3 and N4 are the vehicle traffic on the R555 as well as the railway noise during the night time.

The day and night time noise levels and noise profiles at N1 and N2 are relatively similar with the locations being away from major traffic routes and railway lines, with N3 and N4's noise levels profiles being similar because of both locations proximity to the R555 provincial road as well as the proximity to the railway line.

7.2 Noise Dispersion Modelling Results

This section presents the results of the predictive modelling, which subsequently indicates the noise attenuation from the proposed mining activities in relation to the surrounding noise sensitive receptors. The graphic plots, shown on Plan 2 and Plan 3, present the noise contour lines and visually indicate the noise propagation of the mining activities during the construction and operational phases respectively.

The construction and operational noise models indicate that the noise from the proposed Klipspruit Weltevreden area will not measure above the rural and urban daytime and night time guidelines. The models also indicate that the expected noise produced by the proposed mining of Pit BD and Pit H will not measure above the existing daytime or night time baseline at the surrounding urban receptors such as the Town of Phola and Ogies and as well as the surrounding rural receptors.

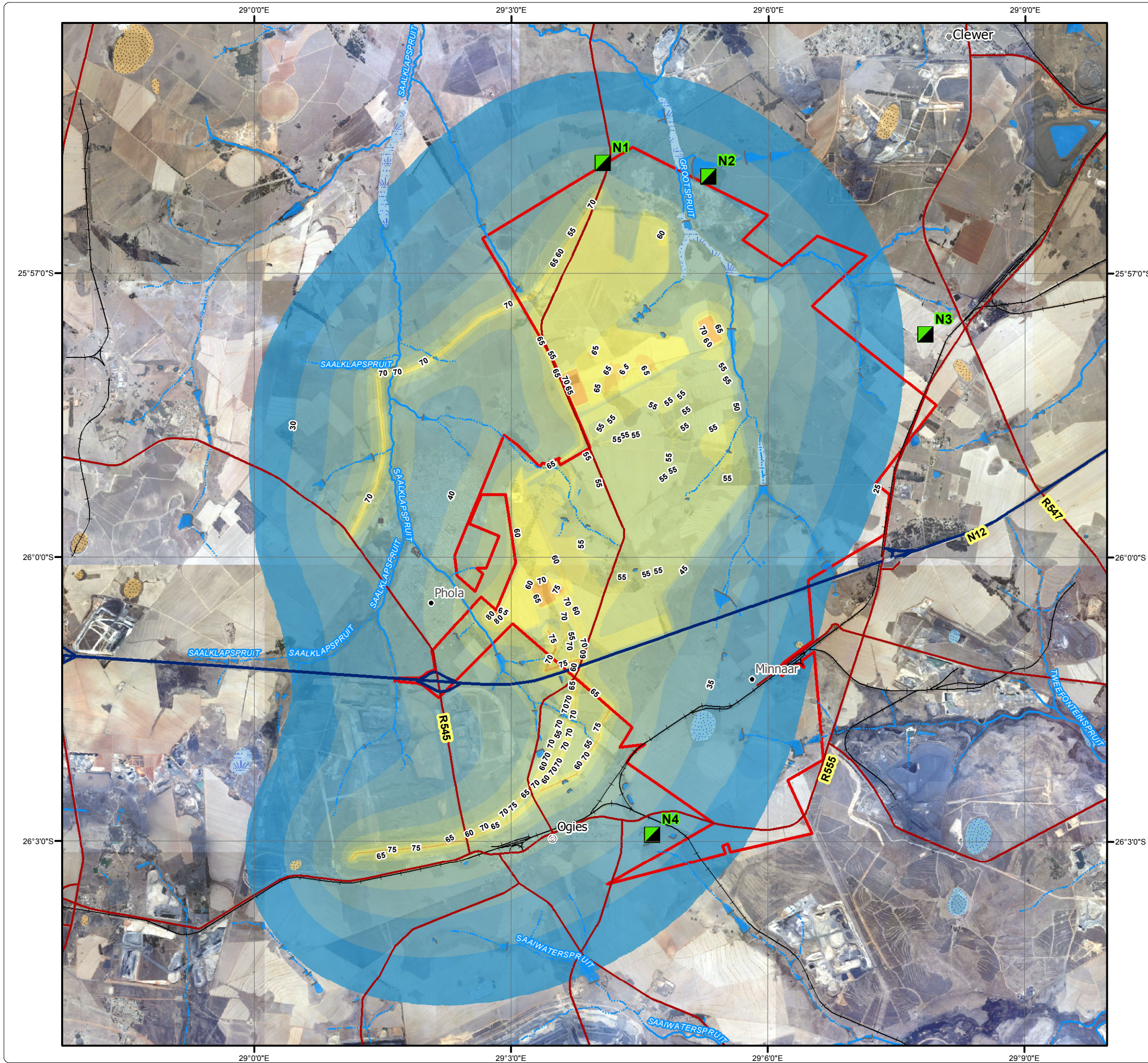
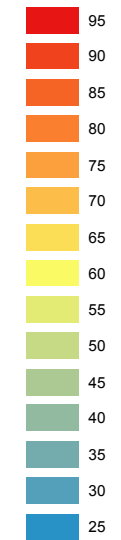
KPSX Weltevreden

Noise Dispersion Model Construction Phase

Legend

- Project Area
- Noise Measurement Locations
- Secondary Town
- Other Town
- Settlement
- Arterial / National Route
- Main Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

Noise dBA Levels

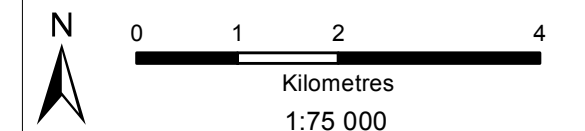


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















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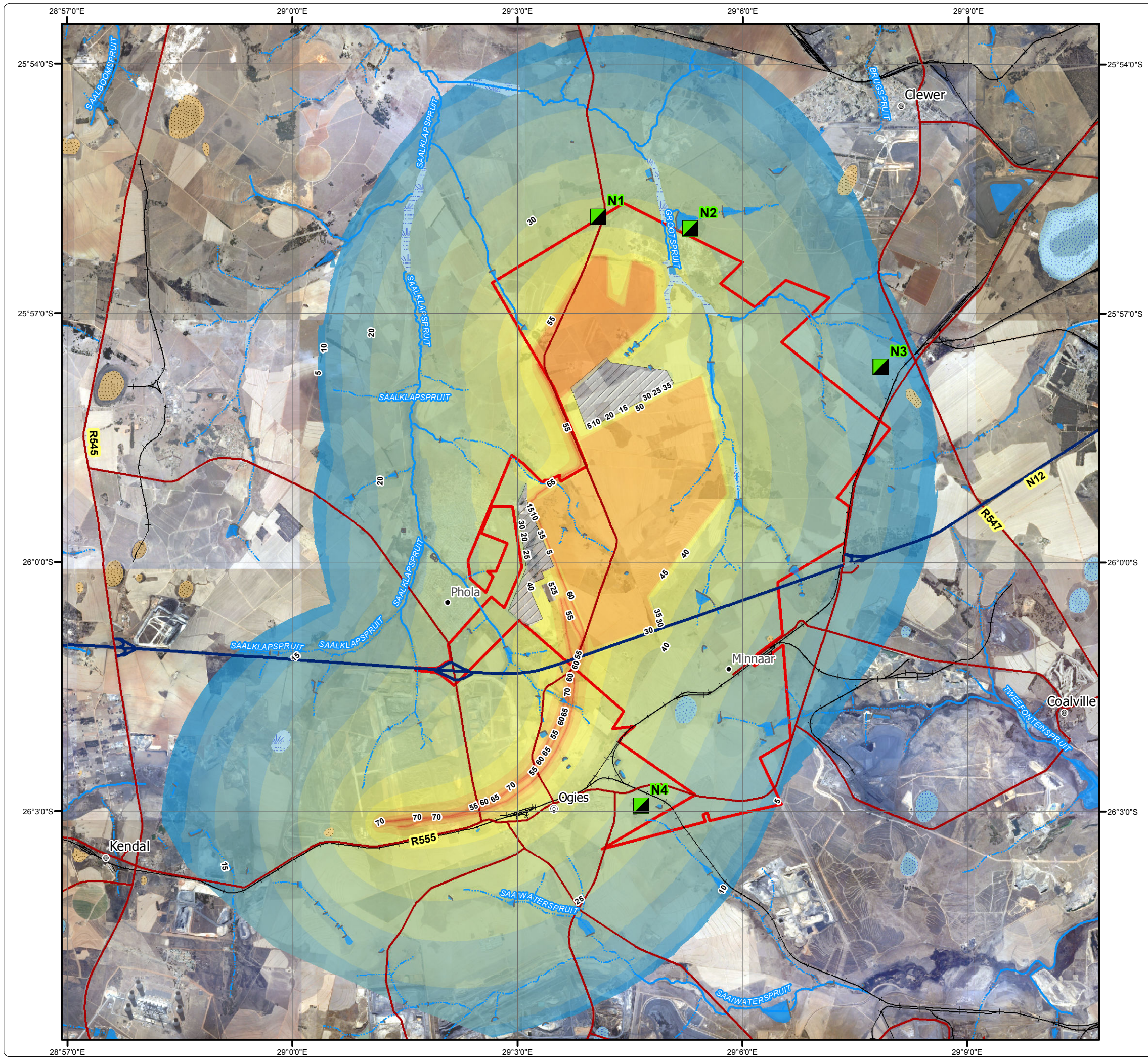


KPSX Weltevreden

Noise Dispersion Model Operational Phase

Legend

	Project Area		Noise Measurement Locations
	Secondary Town		75
	Other Town		70
	Settlement		65
	Arterial / National Route		60
	Main Road		55
	Railway Line		50
	Non-Perennial Stream		45
	Perennial Stream		40
	Dam Wall		35
	Dam / Lake		30
	Non-Perennial Pan		25
	Perennial Pan		20
	Wetland		15
	Stockpile Areas		10
			5



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8 Impact Assessment and Evaluation

8.1 Environmental Impact Assessment Methodology

The EIA utilises a rigorous, numerical environmental significance rating process which is based on the accepted impact assessment methodology that uses the probability of an event occurring and the severity of the impact, should an event occur, as factors to determine the significance of a particular environmental risk.

To determine the severity of any potential environmental impact, the criteria that are taken into consideration are the spatial extent of the impact, the duration of the impact and the severity of the impact. The probability of an impact occurring is determined by the frequency at which the activity takes place and by how often the type of impact in question has taken place or takes place in similar circumstances. The values assigned to these factors (weighting) are discussed as part of the EIA.

To clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental impacts. Even though Digby Wells and the majority of the environmental impact assessment practitioners propose a numerical methodology for impact assessment, it needs to be accepted that the process of environmental significance determination is inherently subjective. The weight assigned to each factor of a potential impact, and also the design of the rating process itself, is based on the values and perception of risk by members of the assessment team, as well as that of the I&APs and authorities who provide input into the process.

Whereas the determination of the spatial scale and the duration of impacts are to some extent amenable to scientific enquiry, the severity value assigned to impacts is highly dependent on perceptions and values of all involved. It is for this reason that it is crucial that all EIAs make reference to the environmental and socio-economic context of the proposed activity to reach an acceptable rating of the significance of impacts. Similarly, the perception of the probability of an impact occurring is dependent on perceptions, aversion to risk and availability of information.

It has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defensible methodology of rating the relative significance of impacts in a specific context.

For the purpose of this study, the methodology employed for the environmental impact assessment is divided into two distinct phases, namely, impact identification and impact rating.

8.2 Impact rating in terms of its nature, extent, duration, probability and significance

The methodology utilised to assess the significance of potential social and heritage impacts is discussed in detail below. The significance rating formula is as follows:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

Where

$$\text{Consequence} = \text{Type of Impact} \times (\text{Intensity} + \text{Spatial Scale} + \text{Duration})$$

And

$$\text{Probability} = \text{Likelihood of an Impact Occurring}$$

In addition, the formula for calculating consequence:

$$\text{Type of Impact} = +1 \text{ (Positive Impact) or } -1 \text{ (Negative Impact)}$$

The weight assigned to the various parameters for positive and negative social and heritage impacts is provided for in the formula and is presented in Table 8-1. The probability consequence matrix for social and heritage impacts is displayed in Table 8-2, with the impact significance rating described in Table 8-3.

Table 8-1: Social and Heritage Impact Assessment Parameter Ratings

Rating	Intensity		Spatial scale	Duration	Probability
	<i>Negative Impacts</i> (Type of Impact = -1)	<i>Positive Impacts</i> (Type of Impact = +1)			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Noticeable, on-going social and environmental benefits which have improved the livelihoods and living standards of the local community in general and the environmental features.	<u>International</u> The effect will occur across international borders.	<u>Permanent: No Mitigation</u> The impact will remain long after the life of the Project.	<u>Certain/ Definite.</u> There are sound scientific reasons to expect that the impact will definitely occur.
6	Significant impact on highly valued species, habitat or ecosystem. Irreparable damage to highly valued items of cultural significance or breakdown of social order.	Great improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	<u>National</u> Will affect the entire country.	<u>Beyond Project Life</u> The impact will remain for some time after the life of a Project.	<u>Almost certain/Highly probable</u> It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to	On-going and widespread positive benefits to local communities which	<u>Province/ Region</u> Will affect the entire province	<u>Project Life</u> The impact will cease after the operational life span of the	<u>Likely</u> The impact may occur.

Rating	Intensity		Spatial scale	Duration	Probability
	<i>Negative Impacts</i> (Type of Impact = -1)	<i>Positive Impacts</i> (Type of Impact = +1)			
	rehabilitate. Very serious widespread social impacts. Irreparable damage to highly valued items.	improves livelihoods, as well as a positive improvement to the receiving environment.	or region.	Project.	
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense social benefits to some people. Average to intense environmental enhancements.	<u>Municipal Area</u> Will affect the whole municipal area.	<u>Long term</u> 6-15 years.	<u>Probable</u> Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some.	<u>Local</u> Extending across the site and to nearby settlements.	<u>Medium term</u> 1-5 years.	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur.

Rating	Intensity		Spatial scale	Duration	Probability
	<i>Negative Impacts</i> (Type of Impact = -1)	<i>Positive Impacts</i> (Type of Impact = +1)			
2	<p>Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/without help of external consultants.</p> <p>Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.</p>	<p>Low positive impacts experience by very few of population.</p>	<p><u>Limited</u> Limited to the site and its immediate surroundings.</p>	<p><u>Short term</u> Less than 1 year.</p>	<p><u>Rare/ improbable</u> Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures.</p>
1	<p>Limited damage to minimal area of low significance that will have no impact on the environment.</p> <p>Minimal social impacts, low-level repairable damage to commonplace structures.</p>	<p>Some low-level social and environmental benefits felt by very few of the population.</p>	<p><u>Very limited</u> Limited to specific isolated parts of the site.</p>	<p><u>Immediate</u> Less than 1 month.</p>	<p><u>Highly unlikely/None</u> Expected never to happen.</p>

Table 8-2: Probability Consequence Matrix for Social and Heritage Impacts

		Significance																																					
		7	6	5	4	3	2	1																															
Probability	7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
	6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
	5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
	4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
	3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
	2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
	1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
		Consequence																																					

Table 8-3: Significance Threshold Limits

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the Project. The impact may result in permanent positive change.	Major (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the Project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment.	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	Moderate (negative)

Score	Description	Rating
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	Major (negative)

8.3 Potential Environmental Noise Impacts for Each Phase of the Project

Environmental noise impacts are listed below according to the phase of the mining activities. The significance of the potential impacts is rated before and after the implementation of mitigation and management measures.

8.3.1 Construction Phase

The Construction Phase involves the following activities that may impact on the ambient noise levels:

- Site clearance and topsoil removal prior to the commencement of physical construction activities, as well as the open pit mining. This activity refers to the conversion of undeveloped, vacant land into industrial use;
- Construction of surface infrastructure will take place, including the offices, haul roads, PCDs ,, conveyor belt and berms and
- The establishment of the initial boxcut and access ramps to the open pit mining areas.

Table 8-4: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the construction phase

Criteria	Details / Discussion				
Description of impact	<ul style="list-style-type: none"> ■ Mining machinery and vehicles may increase ambient noise levels at surrounding urban and rural noise sensitive receptors 				
Mitigation required	<ul style="list-style-type: none"> ■ Restricting construction activities to daylight hours where viable; ■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use. 				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	2	2	-2	3	-18
Post-Mitigation	1	2	-1	2	-8

8.3.2 Operational Phase

The Operational Phase involves the following activities that may impact on the ambient noise levels:

- Drilling and blasting of the overburden rock for easy removal by excavators and dump trucks;
- Coal removal by truck and shovel methods from the exposed coal seams. The coal is removed with shovels and transported to the plant and conveyor belt by trucks;
- Vehicular activity on the proposed haul roads. Mining equipment will utilise the haul roads to access open pit areas, as well as to transport coal from the opencast pit to the plant and conveyor belt. The haul road will consist of two wetland and stream crossings; and
- Concurrent replacement of overburden and topsoil and the re-vegetation of mined out strips. The mined strip will be backfilled with the overburden and compacted. Subsequently, the topsoil will be placed on top of the overburden and the area will be vegetated.

Table 8-5: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the operational phase

Criteria	Details / Discussion				
Description of impact	<ul style="list-style-type: none"> ■ Mining machinery and vehicles may increase ambient noise levels at surrounding noise sensitive receptors 				
Mitigation required	<ul style="list-style-type: none"> ■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use. 				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	2	5	-2	3	-27
Post-Mitigation	1	5	-1	2	-14

8.3.3 Decommissioning Phase

The Decommissioning Phase involves the following activities that may impact on the ambient noise levels:

- Demolition of infrastructure; and
- Final replacement of overburden and topsoil.

Table 8-6: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the decommissioning phase

Criteria	Details / Discussion				
Description of impact	<ul style="list-style-type: none"> ■ Mining machinery and vehicles may increase ambient noise levels at surrounding urban and rural noise sensitive receptors. 				
Mitigation required	<ul style="list-style-type: none"> ■ Restricting construction activities to daylight hours where viable; ■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use. 				
<i>Parameters</i>	<i>Spatial</i>	<i>Duration</i>	<i>Intensity</i>	<i>Probability</i>	<i>Significant rating</i>
Pre-Mitigation	2	2	-2	3	-18
Post-Mitigation	1	2	-1	2	-8

8.3.4 Post-closure Phase

The construction, operational and decommissioning activities will have ceased and the subsequent noise levels from the activities will have ceased, therefore no post closure impacts expected and also no post closure monitoring programme is recommended.

9 Cumulative Impacts

Cumulative impacts should be considered for the overall improvement of ambient noise levels. The proposed project is considered a causative source of noise pollution of low significance.

The existing noise sources in the immediate area of the proposed project are typical noise sources such as from the vehicle activity on the surrounding provincial roads i.e. the R555 and the N12. Frequent heavy vehicle activity from the surrounding mining collieries also being the main existing noise source.

The proposed KPSX: Weltevreden mining activities are not expected to have a significant cumulative impact on the existing noise sources because as the noise models indicate the noise propagation will be lower than the existing noise levels and will therefore not increase the existing ambient noise levels.

10 Mitigation Measures and Management Plan

The objectives described for the recommended mitigation and/or management measures for each identified impact associated with each activity are presented below in Table 10-1. Table 10-1 lists the relevant activities for each phase of the mining operation and provides information pertaining to the legal requirements, recommended actions plans, timing, responsible person and significance after mitigation.

Table 10-1: Mitigation measures and management plan

Activity	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Responsible Person
Construction phase							
Site clearance and topsoil removal; Construction of associated infrastructure; and Establishment of initial boxcut.	To prevent the noise emanating from the construction machinery from impacting on the sensitive receptors	<ul style="list-style-type: none"> Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and Switching off equipment when not in use. 	Vehicles to be service according to service plan. Machinery to be switched off when not in use.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Regular vehicle inspections.	Construction	Environmental Manager
Operational phase							
Drilling and blasting; Coal removal; Vehicle movement on haul roads; and Concurrent rehabilitation	To prevent the noise emanating from the blasting and mining machinery from impacting on the sensitive receptors	<ul style="list-style-type: none"> Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; Switching off equipment when not in use; and As for the blasting operations it is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. The following with regards to blasting operations is recommended: <ul style="list-style-type: none"> The use of millisecond delays between rows of blast holes in a given blasting pattern in order to reduce the amount of explosive charge detonated at any given instant is recommended (Sengupta,1993); Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden; Restriction of blasting to daylight hours are mitigation measures that should be followed (Sengupta, 1993); and Maintaining good public relations with the surrounding communities i.e. warning the local communities in advance before blasts. 	Vehicles to be service according to service plan; Machinery to be switched off when not in use; and Blasting mitigation measures to be implemented for every occurrence.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Regular vehicle inspections.	Operational phase	Environmental Manager
Decommissioning phase							
Demolition of infrastructure; and Final rehabilitation	To prevent the noise emanating from the machinery from impacting on the sensitive receptors	<ul style="list-style-type: none"> Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and Switching off equipment when not in use. 	Vehicles to be service according to service plan. Machinery to be switched off when not in use.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Regular vehicle inspections.	Decommissioning phase	Environmental Manager

*Please note no monitoring programme is recommended because of the low impact significance.

11 Conclusion

Based on the national noise control regulations, whereby disturbing noise means a noise level that causes the ambient noise level to rise above the designated zone or district level, or if no zone level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more, it is concluded that the proposed mining activities from Pit BD and Pit H will not impact on the surrounding urban or rural areas.

The main reason for the low impact is because the expected noise levels from the mining activities will measure at around 15 – 25 dBA lower than the existing baseline noise levels at the surrounding rural receptors and at around 10 dBA lower than the existing baseline levels at the surrounding urban receptors. The expected noise from the KPSX: Weltevreden project will therefore not increase the existing ambient noise levels.

12 References

National Conservation Act, Act 73 of 1989;

National Environmental Management Act, Act no 107 of 1998;

National Environmental Management Air Quality Act, Act no 39 of 2004;

National Noise Control Regulations;

Sengupta, M. *Environmental Impacts of Mining: Monitoring, Restoration, and Control*. CRC Press, 1993;

South African National Standard - Code of practice, SANS 10103:2008, Edition Six, *The measurement and rating of environmental noise with respect to annoyance and to speech communication*. Available [online] <http://www.sabs.co.za>.

Appendix A: Curriculum Vitae and Declaration of Independence

Mr. Lukas Sadler
Environmental Consultant
Noise Unit
Digby Wells Environmental (Pty) Ltd

Education

2013: Course in Environmental Noise Control
2010: Short course in Air Quality Management
2009: Short course in Occupational and Environmental Noise
2002 – 2004: BCom Environmental Management (North West University)

Employment

November 2007 - Present: Digby Wells Environmental
May 2006 – July 2007: West View Rail (Pty) Ltd (London)

Experience

During my two year stay in London from September 2005 – September 2007, I worked for West View Rail (Pty) Ltd on the London Underground Railway.

I am currently working at Digby Wells Environmental in the Environmental Noise Unit, where I am responsible for the Noise Impact Assessments relating to EIA/EMP's, as well as assisting with the compilation of reports such as environmental impact assessments. This includes experience working with projects in accordance with the International Finance Corporation (IFC) and World Bank standards, in countries such as Namibia, Mali, Senegal, Ghana, Mozambique Liberia, DRC and Sierra Leone.

My core focus is working on Environmental Noise Impact Assessments, which includes the assessment, remediation and management of impacts related to noise nuisance for the construction, mining and petrochemical industry.

Further responsibilities and experience gained at Digby Wells Environmental currently include, but are not limited to:

- Assisting with the compilation of EIA's and EMP's; and
- Noise monitoring (baseline as well as continuous compliance monitoring).

Project experience

- Noise Impact Assessments
 - Boikarabelo Colliery – RSA
 - Putu Iron Ore Project – Liberia
 - New Liberty Gold Mine – Liberia

- Thabametsi Colliery – RSA
- Temo Coal Project – RSA
- Cooke Uranium Project – RSA
- Kibali Gold Project - DRC
- Sadiola ESIA – Mali
- Mmamabula Optimisation Project - Botswana
- Koidu – Sierra Leone

- Dust Monitoring Experience
 - Mashala Resources – South Africa
 - Anglo Gold Ashanti Iduapriem Mine – Ghana
 - Eastplats – South Africa
 - Universal Coal – South Africa

Professional affiliations

The National Association for Clean Air (NACA)

Declaration of Independence

I, Lukas Sadler, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed Klipspruit Weltevreden Mining project;
- Do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2006;
- Do not have nor will have a vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the competent authority, any information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2006;

Lukas Sadler

Name of the Specialist



Signature of the Specialist

Digby Wells and Associates (Pty) Ltd

Name of company

07/11/2014

Date