ENVIRONMENTAL NOISE IMPACT ASSESSMENT

FOR THE PROPOSED MINING ACTIVITIES ON THE FARM WOLVENFONTEIN 244 IR

UNIVERSAL COAL (PTY) LTD.

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EXECUTIVE SUMMARY

Baseline noise measurements were conducted at various receptors within a 2km radius around the project site. In total there are nine receptors (UN1 – UN9). The majority of the receptors consisted of homesteads. The results were compared to the rating levels established by the South African Bureau of Standards (SABS). The South African National Standard for "the measurement of environmental noise with respect to land use, health, annoyance and speech communication" (SANS 10103:2008) underwritten by SABS, gives guidelines for acceptable rating levels for ambient noise in various districts for land use purposes

Most of the daytime results indicate that the levels at the various receptors were below the maximum allowable level for rural districts, the single measurement that was slightly higher was due to noise associated with the vehicular traffic, domestic animals and birdsong.

It is expected that during the operational phase the noise levels generated by the mining activities will impact on the ambient noise level at receptors UN1, UN2, UN6, UN7 and UN9 during the night time.

It is expected that the blasting activities only will impact on receptors UN1, UN2, UN6, UN7 and UN9. The identified mining activities throughout the decommissioning phase will have a low significance of impact on most of the receptors.

It is recommended that a berm be constructed to help with the attenuation of the noise that will be produced by the mining activities. The berm should be constructed on the south eastern side of the proposed area of disturbance (as per current mine plan) so that it is situated between the main noise source and sensitive noise receptor UN9, as close to the noise sources as possible. The berm will help with the attenuation of noise produced by the mining activities. Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%.

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1 TERMS OF REFERENCE

Digby Wells and Associated (DWA) was commissioned by Universal Coal (Pty) Ltd to conduct an environmental noise impact assessment for the proposed mining activities on the farm Wolwenfontein 244 IR in the Nkangala district municipality in the Mpumalanga province. The purpose of the study was to assess the potential impact of the proposed mining activities on the ambient noise climate of the area, which is primarily rural. The approach used in investigating noise impacts is based on guidelines provided by the South African National Standards (SANS). The following legislation was considered for this survey:

- The National Environmental Management Act (Act no 107 of 1998), NEMA;
- The National Environmental Management Air Quality Act (Act no 39 of 2004), NEMAQA; and
- The Environment Conservation Act, 1989 (Act 73 of 1989).

The Environmental Noise Impact Assessment report includes baseline noise measurements taken at identified receptors, predicted noise impacts on the identified receptors during the various mining phases as well as recommendations, mitigation measures for potential impacts and monitoring plan.

2 INTRODUCTION

Mining is a contributor to environmental noise pollution, with noise sources such as blasting and machinery used during construction, operation and decommissioning. These noise sources impact on the local ambient noise levels. There are three major categories of noise sources associated with mining. They are:

- Fixed equipment or process operations (generators, pumps, electrical equipment, crushers, drilling);
- Mobile equipment or process operations (haulage, service operations); and
- Blasting operations.

Baseline noise measurements in support of an environmental noise impact assessment were performed for the proposed project. The baseline noise measurements were done to determine the present ambient noise levels at the relevant receptors.

SANS currently have no documented standards describing acceptable noise levels for mining. The SANS10103:2008 "The measurement and rating of environmental noise with respect to health, land use, annoyance and to speech communication" (SANS10103:2008), has thus been used to assess the noise impacts of the mining operation. The SANS10103:2008 covers methods and provides guidelines to assess working and living environments with respect to acoustic comfort, excellence, preservation of health, land use and with respect to possible annoyance by noise. In addition the SANS 10103:2008 guidelines give the acceptable levels of noise in both residential and non residential areas.

The results of the baseline measurements have been included in this report. Mitigation measures for the construction, operational and decommissioning phases and suitable recommendations are included in the report as well as monitoring plan to be followed throughout the life of mine.

3 STUDY AREA

The Project area is located 80km due east of the centre of Johannesburg, close to good road and railway infrastructure and within a radius of 30-70km from four coal-fired power stations. Nearby operating coal mines include Leeuwpan and Stuart Coal. The nearest towns are Delmas, Devon and Leandra.

4 EXPERTISE OF THE SPECIALIST

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

5 METHODOLOGY

The approach used in investigating noise impacts is based on guidelines provided by SANS 10103:2008. According to the SANS 10103:2008 guidelines, the sound pressure level is used as the measurement unit for noise. The acceptable rating levels according to SANS 10103:2008 for ambient noise in different districts (residential and non residential) are presented in Table 1.

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

1	2	3	4	5	6	7
Type of District	Equivalent continuous rating level (LReg.T) for noise dBA					
	Outdoors			Indoors, with open windows		
	Day-night LR,dna	Day-time LReq,db	Night-time LReq,nb	Day-night LR,dna	Day-time LReq,db	Night-time LReq,nb
RESIDENTAIL DISTRICTS						
a) Rural districts	45	45	35	35	35	25
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 LR,dn exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor LReq,T values in line with those given in table 1.						
NOTE 4 For industrial districts, the LR,dn concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, LReq,d = LReq,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 Aweighted 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 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 2, where LReq,T is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time period of not less then 30 minutes. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Table 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 LReq,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		
4) $\Delta L_{Req,T}$ = Expected increase in $L_{Req,T}$ of ambient noise in an area because of a proposed development under investigation.		

Baseline noise measurements were taken at various farmsteads, within a radius of two kilometres from the proposed mining activities. The two kilometre buffer zone has been selected in accordance to the Concawe method (SANS 10357) of calculating noise propagation.

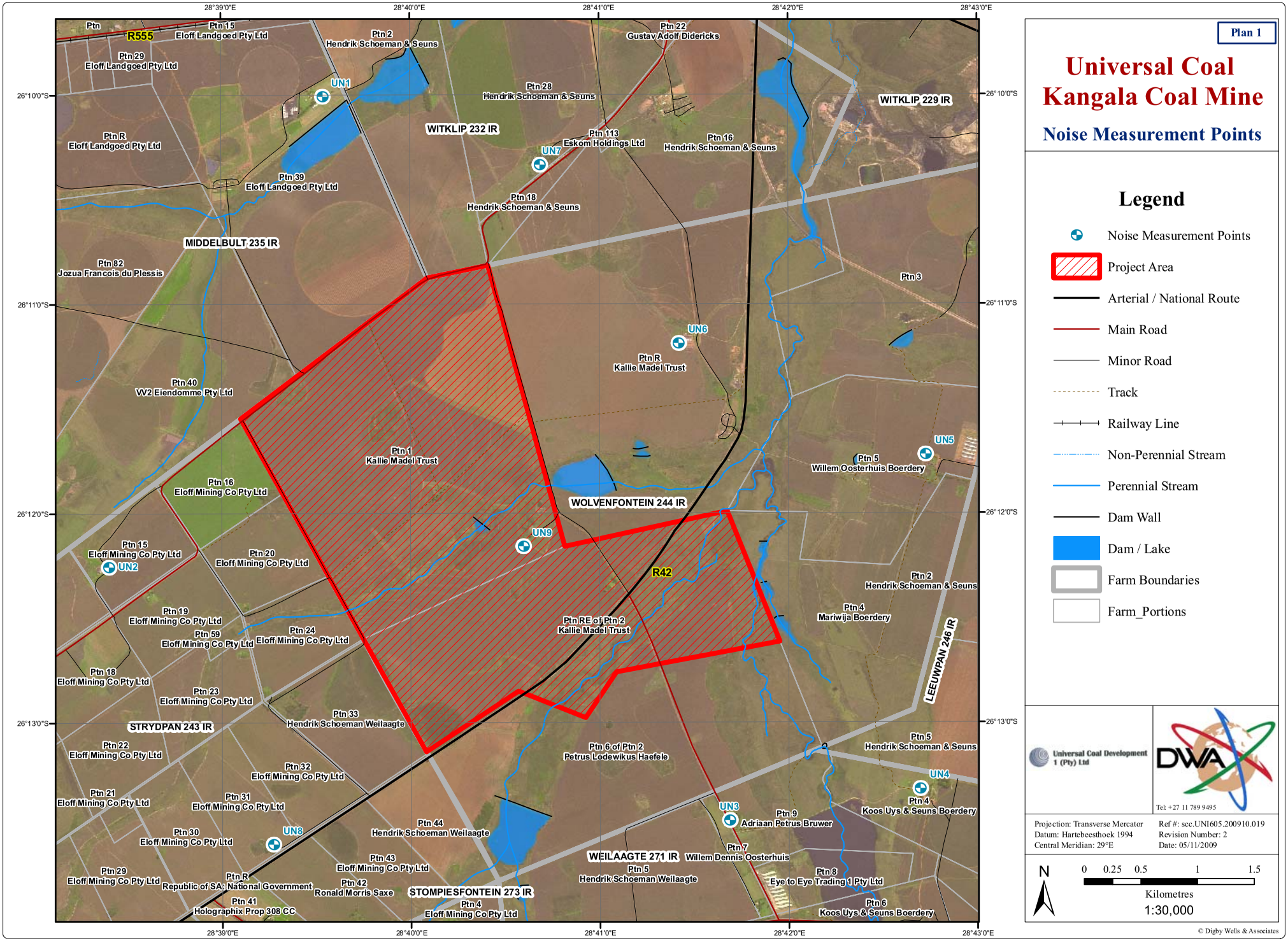
According to the SANS 10103:2008 guidelines, 'daytime' is defined as anytime between 06:00 to 22:00, and 'night time' between 22:00 to 06:00. As a result of these guidelines, measurements were taken once during the daytime and once during night time at each identified noise receptor. Monitoring was taken at a measurement of 1.5 meters above ground level, and for a minimum period of 30 minutes (SANS 10103:2008).

A Quest (Model 1900), Type 1, impulse and precision integrating sound level meter (calibration certificates are available on request) was used for the measurements. The instrument was field calibrated with a Quest QC-10, sound level calibrator. Meteorological conditions at the time of the measurements were measured with a Kestrel 3500 pocket weather meter. Certificates of calibration for these instruments are available on request.

A list of identified receptors, within the 2km range where noise measurements were recorded, is presented in Table 3 as well as illustrated on Plan 1 below. Photographs of the identified receptors are also presented in Figure 1 to Figure 8.

Table 3: Identified receptors

Code	Farm	Portion	Receptor type	Owner	Figure
UN1	Middelbult 235 IR	39	Homestead	Josua Boerdery	1
UN2	Strydpan 243 IR	15	Homestead	Eloff Mining Co pty ltd	2
UN3	Weilaagte 271 IR	9	Homestead	Adriaan Bruwer	3
UN4	Weilaagte 271 IR	4	Homestead	Koos Uys	4
UN5	Wolwenfontein 244 IR	5	Homestead	Willem Ooterhuis	5
UN6	Wolwenfontein 244 IR	R	Stores	Kallie Madel Trust	6
UN7	Witklip 232 IR	28	Homestead	Hendrik Schoeman en Seuns	7
UN8	Strydpan 243 IR	31	Homestead	Eloff Mining Co pty ltd	8
UN9	Wolwenfontein 244 IR	1	Homestead	Kallie Madel Trust	9



Plan 1

Universal Coal Kangala Coal Mine

Noise Measurement Points

Legend

- Noise Measurement Points
- Project Area
- Arterial / National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam / Lake
- Farm Boundaries
- Farm_Portions

Universal Coal Development 1 (Pty) Ltd

DWA

Tel: +27 11 789 9495

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 29°E

Ref #: scc.UNI605.200910.019
Revision Number: 2
Date: 05/11/2009

N

0 0.25 0.5 1 1.5

Kilometres

1:30,000

Figure 1: View of the residence on portion 39 of the farm Middelbult 235 IR

Figure 2: View of the residence on portion 15 of the farm Strydpan 243 IR

Figure 3: View of the residence on portion 9 of the farm Weilaagte 271 IR

Figure 4: View of the residence on portion 4 of the farm Weilaagte 271 IR

Figure 5: View of the residence on portion 5 of the farm Wolwenfontein 244 IR

Figure 6: View of the warehouses on the remaining extent of the farm Wolwenfontein 244 IR

Figure 7: View of the residence on portion 28 of the farm Witklip 232 IR

Figure 8: View of the residence on portion 31 of the farm Strydpan 243 IR

Figure 9: View of the residence on portion 1 of the farm Wolwenfontein 244 IR

5.1 Results

Results obtained from the noise survey will be addressed per sample point. The results from the noise meter recordings for all the sampled points as well as the SANS rating limits are presented in Table 4. Additionally this table also presents the recorded date, time and meteorological conditions.

Table 4: Results of the baseline noise measurements

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Maximum/Minimum dBA	Date/Time	Meteorological conditions
UN1	Rural	Daytime	45	43.3	51.3 / 35.5	26/08/2009 09:00	Temp: 21.6°C Wind: West @ 1.3 m/s Humidity: 29.8%
		Night time	35	32.7	47.6 / 23.9	26/08/2009 22:00	Temp: 8.1°C Wind: West @ 0.3 m/s Humidity: 50.6%
UN2	Rural	Daytime	45	44.1	63 / 37.3	26/08/2009 10:40	Temp: 21.6°C Wind: West @ 1.3 m/s Humidity: 31.2%
		Night time	35	33.3	52.2 / 30.5	26/08/2009 22:30	Temp: 8.1°C Wind: West @ 0.3 m/s Humidity: 50.6%
UN3	Rural	Daytime	45	50.1	60.9 / 35.5	25/08/2009 17:20	Temp: 16°C Wind: West @ 0.5 m/s Humidity: 39.7%
		Night time	35	32.9	52.2 / 28.4	25/08/2009 23:30	Temp: 8.6°C Wind: West @ 0.9 m/s Humidity: 52%
UN4	Rural	Daytime	45	44.3	54.6 / 31.9	25/08/2009 16:00	Temp: 21.4°C Wind: West @ 0.7 m/s Humidity: 30%
		Night time	35	32.9	47.5 / 29.7	26/08/2009 00:00	Temp: 8.6°C Wind: West @ 0.9 m/s Humidity: 52%
UN5	Rural	Daytime	45	50.4	66.6 / 44.1	26/08/2009 14:00	Temp: 25.5°C Wind: West @ 1.9 m/s Humidity: 19%
		Night time	35	40.2	49.5 / 36.1	27/08/2009 00:00	Temp: 8.1°C Wind: West @ 0.3 m/s Humidity: 50.6%
UN6	Rural	Daytime	45	37.7	54.2 / 29.4	26/08/2009 13:15	Temp: 25.2°C Wind: West @ 1.3 m/s Humidity: 17.7%

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Maximum/Minimum dBA	Date/Time	Meteorological conditions
		Night time	35	34.5	50.8 / 28.7	26/08/2009 23:25	Temp: 8.6°C Wind: West @ 0.9 m/s Humidity: 52%
UN7	Rural	Daytime	45	42.7	58.2 / 32.6	26/08/2009 12:00	Temp: 22.2°C Wind: West north west@ 1.4 m/s Humidity: 23.1%
		Night time	35	34.4	49.4 / 29.4	26/08/2009 23:00	Temp: 8.1°C Wind: West @ 0.3 m/s Humidity: 50.6%
UN8	Rural	Daytime	45	46.1	67.5 / 29.6	25/08/2009 13:00	Temp: 22.9°C Wind: West @ 0.8 m/s Humidity: 28.5%
		Night time	35	45	73.2 / 42	25/08/2009 22:00	Temp: 9.3°C Wind: West @ 0.3 m/s Humidity: 57.1%
UN9	Rural	Daytime	45	52.3	78.8 / 30.7	25/08/2009 14:15	Temp: 22.9°C Wind: West @ 0.8 m/s Humidity: 28.5%
		Night time	35	32.5	55 / 27.7	25/08/2009 22:45	Temp: 6.3°C Wind: no wind Humidity: 63.3%
	Indicates $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit						

Note: $L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time period of not less then 30 minutes (the average noise level over the specified time period). The Maximum/Minimum is the highest/lowest reading during the specified time period over which the measurement was taken. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Receptor UN1:

The measurement was taken at the residence of Mr. and Mrs. du Plessis who reside on portion 39 of the farm Middelbult 235 IR. The daytime Leq level measured 43.3 dB which is below the daytime rating limit for rural districts range. The night time Leq level measurement was 32.7 dB which is below the night time rating limit for rural districts.

Receptor UN2:

The measurement was taken at the residence of Mrs Teresa du Plessis who resides on portion 15 of the farm Strydpan 243 IR. The daytime Leq level measurement was 44.1 dB which is below the daytime rating limit for rural districts. The night time Leq level measurement was 33.3 dB which is below the night time rating limit for rural districts.

Receptor UN3:

The measurement was taken at the residence of Mr. Gerhard Opperman who resides on portion 9 of the farm Weilaagte 271 IR. The daytime Leq level measured 50.1 which is slightly above the daytime limit of 45 dB for rural districts. The cause of the high level may have been attributed to occasional barking of dogs on the farm.

The night time Leq level measured 32.9 dB which is below the night time noise limit for rural districts.

Receptor UN4:

The measurement was taken at the residence of Mr Uys, who resides on portion 4 of the farm Weilaagte 271 IR. The daytime Leq level measured 44.3 dB which is below the daytime limit for rural districts. The night time Leq level measured 32.9 dB which is below the night time limit for rural districts.

Receptor UN5:

The measurement was taken at the residence of Mr Jaco Oosterhuis, who resides on portion 5 of the farm Wolwenfontein 244 IR. The daytime Leq level measured 50.4 dB which is above the daytime limit for rural districts. The cause of the high level may be attributed to a tractor that was idling approximately 30 meters from the noise meter for the entire measurement period.

The night time Leq level measured 40.2 dB which is above the night time limit for rural districts. The high night time level was caused by the noise emanating from the existing mining activities at Exxaro's Leeupan Colliery that is located approximately 1.5 km to the north.

Receptor UN6:

The measurement was taken at the Stores of Schoeman Boerdery on the remaining extent of the farm Wolwenfontein 244 IR. The daytime Leq level measured 37.3 dB which is below the daytime limit for rural districts. The night time Leq level measured 34.5 dB which is below the night time limit for rural districts.

Receptor UN7:

The measurement was taken at the residence of Mr Kallie Schoeman, who resides on portion 28 of the farm Witklip 232 IR. The daytime Leq level measured 42.7 dB which is below the daytime limit for rural districts. The night time Leq level measured 34.4 dB which is below the night time limit for rural districts.

Receptor UN8:

The measurement was taken at the residence on portion 32 of the farm Strydpan 243 IR. The daytime Leq level measured 46.1 dB which is slightly above the daytime limit for rural districts. The high noise level was caused by the vehicular traffic on the R42 that is running 50 meters south of the residence.

The night time Leq level measured 45 dB which is above the night time limit for rural districts. The high night time noise level was caused by the vehicular traffic on the R42 as well as the occasional barking of the dogs on the property.

Receptor UN9:

The measurement was taken at the residence on portion 1 of the farm Wolwenfontein 244 IR. The daytime Leq level measured 52.3 dB which is above the daytime limit for rural districts. The high level was caused by birdsong. The night time Leq level measured 32.5 dB which is below the night time limit for rural districts.

6 DISCUSSION OF RESULTS

Based on the results from the baseline environmental noise measurements it is noted that the day time ambient noise levels in and around site are between 37dB and 52dB, ranging from below the maximum daytime allowable outdoor limit for ambient noise in a rural district to slightly above. The reason of the Lreq,t levels being above the acceptable range limit may be attributed to noises associated with farming machinery, existing mines, vehicular traffic on the R42, birdsong as well as domestic animals.

The night time ambient noise levels in and around site are between 32dB and 45dB, ranging from below the maximum night time allowable outdoor limit for ambient noise in a rural district to slightly above. The reason for the Lreq,t levels being above the acceptable range limit may be mining activities at receptor point UN5, as well as the vehicular activities on the R42 influencing the ambient noise levels at receptor UN8.

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Predicted impacts

Mining activities generate noise from various sources. The predicted noise levels of the primary noise sources are presented in Table 5.

Table 5: Noise levels at source

Activity	Noise level at source measured in dBA
Blasting	± 127
Dozer	± 95
Excavator	± 98
Front end Loader	± 95
Haul trucks	± 90
Light delivery vehicles	± 80

The earth moving equipment and haul trucks on site are the primary source for continuous noise generated by the mining activities. Blasting activities cause the highest noise levels but are of an impulsive nature.

The SANS 10357:2004 “The calculation of sound propagation by the Concawe method” addresses a method for calculation of sound propagation taking into account the factors mentioned below. Table 6 - Table 10 in this chapter provides the calculated noise levels of the various mining activities at the receptor points for each phase of the mining operations.

The most important factors affecting noise propagation and that were used to calculate the specific noise levels of the mining activities at the receptors are (Brüel & Kjær, Sound & Vibration Measurement A/S. 2001):

- Type of source (point or line);
- Distance from source;
- Atmospheric absorption;
- Wind;
- Temperature and temperature gradient;

- Obstacles such as barriers and buildings;
- Ground absorption; and
- Humidity.

According to section 5.13 in the environmental impact assessment a preliminary description of the actions, activities and processes that are proposed for the Kangala Coal Mining operation are provided. Each activity can be linked to the various mining, mineral processing, waste management and any other associated activities that constitute the various collieries' operations. These activities act as driving forces that exert pressure on the natural environment, ultimately resulting in impacts on the biophysical, social and cultural environments. Only the activities that are expected to impact on the ambient noise levels of the area are mentioned in this report. The environmental noise impact assessment for the various phases follows below.

7.2 Impact assessment for the construction phase

The construction machinery responsible for the following activities during the construction phase is expected to impact on the ambient noise level of the area:

- Activity 2: Transport of construction materials
- Activity 4: Site clearing and topsoil removal
- Activity 5: Construction of surface infrastructure
- Activity 6A: The establishment of the initial box cut and access ramp

Impact: The construction machinery will be a source of continuous noise through out the construction phase.

Significance: To assess whether the noise from the mining activities will impact on the relevant receptors the calculated noise levels and the baseline noise levels are compared. An increase of about 8−10 dBA is required before the sound subjectively appears to be significantly louder (Brüel & Kjær, 2001). Table 6 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the wet season. Table 7 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the dry windy season. The difference between the predicted noise levels during the wet season and dry windy season is very little and therefore will have the same level of impact. A 'NA' indicates when the baseline noise level at a specific receptor is higher than the predicted noise level from the mining activity at that specific receptor. According to Table 6 and Table 7, it can be seen that the construction machinery will significantly impact on receptors UN7 and UN9 during the night time. The activity is considered to extend beyond the site boundary and the severity will be significant. The overall significance of the impact of the construction machinery on receptors UN7 and UN9 during the night time will be medium-high for a short duration and mitigation is required.

The blasting activities (Activity 6B) during the construction phase are also expected to impact on the ambient noise levels of the area.

Impact: The key noise producing operations during this phase will be the blasting operations

required to allow for the establishment of the initial pit.

Significance: During the construction phase the noise from the blasting activities will impact significantly on receptors UN1, UN2, UN6, UN7 and UN9 during the night time, but is intermittent of nature. The activity is considered to extend beyond the site boundary and the severity will be significant. The overall significance of the impact of the blasting on the above mentioned receptors during the night time will be medium-high for a short duration and mitigation is required.

Table 6: Calculated increase in the ambient noise level for the construction phase during the wet season

Sampling Point	Baseline noise measurement dBA (Daytime / Night time).	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor (Daytime / Night time).	Difference between calculated and baseline ambient noise level (Daytime / Night time).
UN1	43 / 33	1900	Construction machinery that will be active during construction phase	28 / 32	NA / NA
			Blasting	44 / 49	1 / 16
UN2	44 / 33	1650	Construction machinery that will be active during construction phase	33 / 38	NA / 5
			Blasting	50 / 55	6 / 22
UN3	50 / 33	3700	Construction machinery that will be active during construction phase	23 / 25	NA / NA
			Blasting	34 / 37	NA / 4
UN4	44 / 33	5000	Construction machinery that will be active during construction phase	20 / 21	NA / NA
			Blasting	30 / 32	NA / NA
UN5	50 / 40	3500	Construction machinery that will be active during construction phase	24 / 26	NA / NA
			Blasting	35 / 37	NA / NA
UN6	38 / 35	1500	Construction machinery that will be active during construction phase	34 / 37	NA / 2
			Blasting	45 / 48	7 / 13
UN7	43 / 34	1100	Construction machinery that will be active during construction phase	36 / 44	NA / 10
			Blasting	48 / 56	5 / 22

Sampling Point	Baseline noise measurement dBA (Daytime / Night time).	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor (Daytime / Night time).	Difference between calculated and baseline ambient noise level (Daytime / Night time).
UN8	46 / 45	2400	Construction machinery that will be active during construction phase	34 / 40	NA / NA
			Blasting	45 / 52	NA / 7
UN9	52 / 33	800	Construction machinery that will be active during construction phase	44 / 51	NA / 18
			Blasting	56 / 63	4 / 30

Note: The following meteorological conditions for the daytime were used to calculate the noise levels at the receptors; temperature 25° C; relative humidity 60%; dominant wind direction east; wind speed 2 m/s and for the night time; temperature 15° C; relative humidity 70%; dominant wind direction east; wind speed 2 m/s.

Table 7: Calculated increase in the ambient noise level for the construction phase during the dry windy season

Sampling Point	Baseline noise measurement. dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor (Daytime / Night time)	Difference between calculated and baseline ambient noise level (Daytime / Night time)
UN1	43 / 33	1900	Construction machinery that will be active during construction phase	30 / 29	NA / NA
			Blasting	47 / 46	4 / 13
UN2	44 / 33	1650	Construction machinery that will be active during construction phase	32 / 31	NA / NA
			Blasting	48 / 47	4 / 14
UN3	50 / 33	3700	Construction machinery that will be active during construction phase	36 / 34	NA / 1
			Blasting	48 / 46	NA / 13
UN4	44 / 33	5000	Construction machinery that will be active during construction phase	33 / 30	NA / NA
			Blasting	45 / 41	1 / 8
UN5	50 / 40	3500	Construction machinery that will be active during construction phase	37 / 35	NA / NA
			Blasting	49 / 46	NA / 6
UN6	38 / 35	1500	Construction machinery that will be active during construction phase	46 / 45	8 / 10
			Blasting	58 / 57	20 / 22

Sampling Point	Baseline noise measurement. dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor (Daytime / Night time)	Difference between calculated and baseline ambient noise level (Daytime / Night time)
UN7	43 / 34	1100	Construction machinery that will be active during construction phase	45 / 44	2 / 10
			Blasting	57 / 56	14 / 22
UN8	46 / 45	2400	Construction machinery that will be active during construction phase	37 / 35	NA / NA
			Blasting	49 / 47	3 / 2
UN9	52 / 33	800	Construction machinery that will be active during construction phase	53 / 53	1 / 20
			Blasting	66 / 65	14 / 32

Note: The following meteorological conditions for the daytime were used to calculate the noise levels at the receptors; temperature 15° C; relative humidity 30%; dominant wind direction north west; wind speed 3 m/s and for the night time; temperature 5° C; relative humidity 60%; dominant wind direction north west; wind speed 3 m/s

7.3 Impact assessment for the operational phase

Excavators and haul trucks will be in operation during the following activities:

- Activity 10: Topsoil and overburden removal and stockpiling
- Activity 12: Coal removal
- Activity 19: Concurrent replacement of overburden and topsoil and revegetation

Impact: The excavators and haul trucks and other construction machinery which will be responsible for the above mentioned activities will be a source of continuous noise through out the operational phase.

Significance: Table 8 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the wet season. Table 9 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the dry windy season. The difference between the predicted noise levels during the wet season and dry windy season is very little and therefore will have the same level of impact. A 'NA' indicates when the baseline noise level at a specific receptor is higher than the predicted noise level from the mining activity at that specific receptor. According to Table 8 and Table 9, it can be seen that the machinery will significantly impact on receptors UN1, UN2, UN6, UN7 and UN9 during the night time. The activity is considered to extend beyond the site boundary and the severity will be significant. The overall significance of the impact will be medium-high for a medium duration and mitigation is required.

The blasting activities (Activity 11) during the operational phase are also expected to impact on the ambient noise levels of the area.

Impact: The blasting and drilling activities will be the highest noise producing source during the operational phase.

Significance: According to Table 8 and Table 9, it can be seen that the machinery will significantly impact on receptors UN1, UN2, UN6, UN7 and UN9 during the night time. The activity is considered to extend beyond the site boundary and the severity will be serious. The overall significance of the impact will be medium-high for a medium duration and mitigation

is required.

During the operational phase the noise from the blasting activities is expected to impact significantly on receptors UN1, UN2, UN6, UN7 and UN9 during the night time, but the blasting activities will be intermittent of nature. The activity is considered to extend beyond the site boundary and the severity will be serious. The overall significance of the impact will be medium-high for a medium duration and mitigation is required.

The haul trucks will be in continuous operation during the following activity:

- Activity 13: Vehicular activity on haul roads.

Impact: Haul trucks which will be responsible for the hauling of coal to the designated siding will be a source of noise during the operational phase.

Significance: Table 8 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the wet season. Table 9 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the dry windy season. According to Table 8 and Table 9, it can be seen that the machinery will significantly impact on receptors UN1, UN2, UN6, UN7 and UN9 during the night time. The activity is considered to extend beyond the site boundary and the severity will be significant. The overall significance of the impact will be medium-high for a medium duration and mitigation is required.

The wash plant will be in operation during the following activity:

- Activity 15: Screening and Washing

Impact: The washing plant which will be responsible for the screening and washing of the ROM coal will be a noise source during the operational phase.

Significance: The activity is considered to be localized and is expected not to extend beyond the site boundary and the severity is expected to be moderate. The overall significance of the impact will be low for a medium duration and mitigation is required.

Table 8: Calculated increase in the ambient noise level for the operational phase during the wet season

Sampling Point	Baseline noise measurement dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA (Daytime / Night time)		Difference between calculated and baseline ambient noise level dBA (Daytime / Night time)
UN1	43 / 33	1900	Blasting	44 / 49		1 / 16
			Excavator	28 / 32	Cumulative noise level of machinery: 38 / 42	NA / 9
			Haul truck	34 / 37		
			Drill	33 / 38		
			Loader	29 / 32		
UN2	44 / 33	1650	Blasting	50 / 55		6 / 22
			Excavator	33 / 38	Cumulative noise level of machinery: 42 / 48	NA / 15
			Haul truck	38 / 44		
			Drill	38 / 45		
			Loader	33 / 39		
UN3	50 / 33	3700	Blasting	34 / 37		NA / 4
			Excavator	23 / 25	Cumulative noise level of machinery: 28 / 34	NA / 1
			Haul truck	23 / 29		
			Drill	23 / 28		
			Loader	19 / 24		
UN4	44 / 33	5000	Blasting	30 / 32		NA / NA
			Excavator	20 / 21	Cumulative noise level of machinery: 27 / 28	NA / NA
			Haul truck	20 / 25		
			Drill	19 / 24		
			Loader	16 / 20		
UN5	50 / 40	3500	Blasting	35 / 37		NA / NA
			Excavator	24 / 26	Cumulative noise level of machinery: 29 / 35	NA / NA
			Haul truck	24 / 30		
			Drill	23 / 29		
			Loader	20 / 24		

Sampling Point	Baseline noise measurement dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA (Daytime / Night time)		Difference between calculated and baseline ambient noise level dBA (Daytime / Night time)
UN6	38 / 35	1500	Blasting	45 / 48		7 / 13
			Excavator	34 / 37	Cumulative noise level of machinery: 40 / 45	2 / 10
			Haul truck	35 / 40		
			Drill	34 / 41		
			Loader	31 / 37		
UN7	43 / 34	1100	Blasting	48 / 56		5 / 22
			Excavator	36 / 44	Cumulative noise level of machinery: 41 / 49	NA / 15
			Haul truck	36 / 44		
			Drill	36 / 44		
			Loader	32 / 38		
UN8	46 / 45	2400	Blasting	45 / 52		NA / 7
			Excavator	34 / 40	Cumulative noise level of machinery: 39 / 45	NA / NA
			Haul truck	34 / 40		
			Drill	33 / 40		
			Loader	28 / 34		
UN9	52 / 33	800	Blasting	56 / 63		4 / 30
			Excavator	44 / 51	Cumulative noise level of machinery: 48 / 54	NA / 21
			Haul truck	42 / 47		
			Drill	42 / 48		
			Loader	37 / 41		

Note: The following meteorological conditions for the daytime were used to calculate the noise levels at the receptors; temperature 25° C; relative humidity 60%; dominant wind direction east; wind speed 2 m/s and for the night time; temperature 15° C; relative humidity 70%; dominant wind direction east; wind speed 2 m/s.

Table 9: Calculated increase in the ambient noise level for the operational phase during the dry windy season

Sampling Point	Baseline noise measurement dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA (Daytime / Night time)		Difference between calculated and baseline ambient noise level dBA (Daytime / Night time)
UN1	43 / 33	1900	Blasting	47 / 46		4 / 13
			Excavator	30 / 29	Cumulative noise level of machinery: 38 / 37	NA / 4
			Haul truck	34 / 33		
			Drill	34 / 32		
			Loader	29 / 28		
UN2	44 / 33	1650	Blasting	48 / 47		4 / 14
			Excavator	32 / 31	Cumulative noise level of machinery: 42 / 42	NA / 9
			Haul truck	38 / 37		
			Drill	38 / 36		
			Loader	32 / 31		
UN3	50 / 33	3700	Blasting	48 / 46		NA / 13
			Excavator	36 / 34	Cumulative noise level of machinery: 42 / 40	NA / 7
			Haul truck	38 / 35		
			Drill	37 / 35		
			Loader	32 / 30		
UN4	44 / 33	5000	Blasting	45 / 41		1 / 8
			Excavator	33 / 30	Cumulative noise level of machinery: 39 / 36	NA / 3
			Haul truck	34 / 31		
			Drill	34 / 31		
			Loader	28 / 26		
UN5	50 / 40	3500	Blasting	49 / 46		NA / 6
			Excavator	37 / 35	Cumulative noise level of machinery: 42 / 40	NA / NA
			Haul truck	37 / 35		
			Drill	37 / 34		
			Loader	31 / 29		

Sampling Point	Baseline noise measurement dBA (Daytime / Night time)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA (Daytime / Night time)		Difference between calculated and baseline ambient noise level dBA (Daytime / Night time)
UN6	38 / 35	1500	Blasting	58 / 57		22 / 22
			Excavator	46 / 45	Cumulative noise level of machinery: 52 / 50	14 / 15
			Haul truck	46 / 45		
			Drill	47 / 45		
			Loader	41 / 40		
UN7	43 / 34	1100	Blasting	57 / 56		14 / 22
			Excavator	45 / 44	Cumulative noise level of machinery: 50 / 49	7 / 15
			Haul truck	45 / 44		
			Drill	46 / 45		
			Loader	39 / 38		
UN8	46 / 45	2400	Blasting	49 / 47		3 / 2
			Excavator	37 / 35	Cumulative noise level of machinery: 42 / 40	NA / NA
			Haul truck	37 / 35		
			Drill	37 / 35		
			Loader	31 / 30		
UN9	52 / 33	800	Blasting	56 / 63		4 / 30
			Excavator	53 / 53	Cumulative noise level of machinery: 59 / 59	7 / 26
			Haul truck	53 / 53		
			Drill	55 / 53		
			Loader	48 / 47		

Note: The following meteorological conditions for the daytime were used to calculate the noise levels at the receptors; temperature 15° C; relative humidity 30%; dominant wind direction north west; wind speed 3 m/s and for the night time; temperature 5° C; relative humidity 60%; dominant wind direction north west; wind speed 3 m/s

7.4 Impact assessment for the decommissioning phase

The machinery responsible for the following activities during the decommissioning phase is expected to impact on the ambient noise level of the area:

- Activity 21: Demolition of infrastructure
- Activity 22: Final replacement of overburden and topsoil and revegetation

Impact: The activities of the decommissioning phase involve the demolition of infrastructure. Construction machinery which will be responsible for demolition activities will be a source of noise during the decommissioning phase

Table 10 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the wet season for the daytime ands night time . Table 11 represents the difference between the calculated noise levels of the mining activities and the baseline noise levels during the dry windy season. The difference between the predicted noise levels during the wet season and dry windy season is very little and therefore will have the same level of impact. A 'NA' indicates when the baseline noise level at a specific receptor is higher than the predicted noise level from the mining activity at that specific receptor.

Significance: According to Table 10 and Table 11, it can be seen that the decommissioning activities will not impact on the relevant receptors. The activity is not considered to extend beyond the site boundary and the severity will be minor. The overall significance of the impact will be low for a short duration. To prevent the noise levels form the decommissioning activities do not impact on the relevant receptors mitigation measures are still recommended.

It is assumed that the decommissioning activities will take place during the daytime only and therefore the assessment is done for the daytime only.

Table 10: Calculated increase in the ambient noise level for the decommissioning phase during the wet season

Sampling Point	Baseline noise measurement dBA (Daytime)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA (Daytime)	Difference between calculated and baseline ambient noise level dBA (Daytime)
UN1	43	1900	Construction machinery that will be active during decommissioning phase	28	0
UN2	44	1650	Construction machinery that will be active during decommissioning phase	33	0
UN3	50	3700	Construction machinery that will be active during decommissioning phase	23	0
UN4	44	5000	Construction machinery that will be active during decommissioning phase	20	0
UN5	50	3500	Construction machinery that will be active during decommissioning phase	24	0
UN6	38	1500	Construction machinery that will be active during decommissioning phase	34	0
UN7	43	1100	Construction machinery that will be active during decommissioning phase	36	0
UN8	46	2400	Construction machinery that will be active during decommissioning phase	34	0
UN9	52	800	Construction machinery that will be active during decommissioning phase	44	0

Note : The following meteorological conditions were used to calculate the noise levels at the receptors; temperature 25° C; relative humidity 60%; dominant wind direction east; wind speed 2 m/s.

Table 11: Calculated increase in the ambient noise level for the decommissioning phase during the dry windy season

Sampling Point	Baseline noise measurement. dBA (Daytime)	Distance from proposed mine boundary as per current mine plan (m)	Activity	Calculated noise level from activity at specific receptor dBA	Difference between calculated and baseline ambient noise level dBA
UN1	43	1900	Construction machinery that will be active during decommissioning phase	30	0
UN2	44	1650	Construction machinery that will be active during decommissioning phase	32	0
UN3	50	3700	Construction machinery that will be active during decommissioning phase	36	0
UN4	44	5000	Construction machinery that will be active during decommissioning phase	33	0
UN5	50	3500	Construction machinery that will be active during decommissioning phase	37	0
UN6	38	1500	Construction machinery that will be active during decommissioning phase	46	8
UN7	43	1100	Construction machinery that will be active during decommissioning phase	45	2
UN8	46	2400	Construction machinery that will be active during decommissioning phase	37	0
UN9	52	800	Construction machinery that will be active during decommissioning phase	53	1

Note: The following meteorological conditions were used to calculate the noise levels at the receptors; temperature 15° C; relative humidity 30%; dominant wind direction north west; wind speed 3 m/s.

8 MITIGATION MEASURES

The objectives described for the recommended mitigation and/or management measures for each identified impact associated with each activity are presented below in Table 12. Table 12 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 12: Information pertaining to the recommended mitigation measures for the identified impacts associated with each activity.

Activity	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Responsible Person	Significance after Mitigation
2. Transport of construction material	To prevent the noise emanating from the Transport vehicles from impacting on the sensitive receptors	Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Limiting transport activities to daylight hours.	According to service plan	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Noise monitoring programme to be followed. Regular vehicle inspections Implement grievance mechanism	Construction	Environmental Manager	Medium-low
4. Site clearing and topsoil removal; 5. Construction of surface infrastructure; 6.Establishment of box cut and access ramp; 10. Topsoil removal and stockpiling; 12. Removal of coal; 19. Concurrent replacement of overburden and topsoil and revegetation	To prevent the noise emanating from the construction machinery from impacting on the sensitive receptors	A noise barrier in the form of a berm should be constructed on the western as well as south eastern side of the proposed area of disturbance (as per current mine plan) so that it is situated between the main noise source and sensitive noise receptor UN9, as close to the noise sources as possible. The berm will help with the attenuation of noise produced by the mining activities. A basic rule of thumb for barrier height is: Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receiver, plus 30%. So if the line-of-sight is 10m high, then the barrier should be at least 13m tall for best performance (Sound Fighter Systems, 2007). Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Switching off equipment when not in use.	Berm should be constructed as soon as the construction phase commences. 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)	Noise monitoring programme to be followed. Regular vehicle inspections. Height modifications to berm if not sufficiently attenuating noise (which will be evident through the noise monitoring programme)	Construction	Environmental Manager	Medium-low
11. Drilling and blasting	To prevent the noise emanating from the blasting from impacting on the sensitive receptors	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: 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, M.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, M.1993); and Areas to be clearly demarcated and signs to be erected indicating blasting zones.	Before every blast.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Noise and Vibration monitoring	Operational	Environmental Manager	Medium-high
15. Screening and Washing	To prevent the noise emanating from washing plant from impacting on the sensitive receptors	Optimum location of plant, away from nearest sensitive receptors. Noise barriers in the form of screens installed at various positions around the wash plant.	Ongoing though out operational phase	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Noise monitoring programme to be followed.	Operational	Environmental Manager	Low
21. Demolition	To prevent the	Limiting demolition activities to daylight hours.	Ongoing through out	National Environmental	Noise monitoring	Decommissioning	Environmental	Low

Activity	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Responsible Person	Significance after Mitigation
	noise emanating from the demolition activities from impacting on the sensitive receptors	Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Limiting demolition activities to daylight hours. Switching off equipment when not in use.	decommissioning phase	Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	programme to be followed. Regular vehicle inspections.		Manager	
22. Final replacement of overburden and topsoil and revegetation	To prevent the noise emanating from the machinery from impacting on the sensitive receptors	Limiting activities to daylight hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers. Switching off equipment when not in use.	Ongoing through out decommissioning phase	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Noise monitoring programme to be followed. Regular vehicle inspections.	Decommissioning	Environmental Manager	Low
24. Post closure monitoring	To assess whether noise levels have returned to pre mining levels	n/a	Bi-annually for one year.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Noise monitoring plan to be carried out bi-annually	Post closure	Environmental Manager	Neutral

9 CUMULATIVE IMPACTS

Cumulative impacts should be considered for the overall improvement of ambient noise levels. The proposed Kangala project is considered a causative source of noise pollution that will contribute to the increase of the ambient noise levels in the area, especially during the night time as indicated by the impact assessment section (section 7.2).

The existing noise sources in the area are: The vehicular activity on the R555 and R42, the agricultural activities on the farms as well as the Leeufontein Colliery. The significance of the impacts of the existing noise sources on the relevant receptors is of a low significance. The low significance is due to the intermittent nature of the main existing noise sources, especially the seasonal noise e.g during ploughing season general noise is expected to increase. If the proposed mining activities on Wolwenfontein go ahead the cumulative impact will be more severe on the existing ambient noise levels. The significance will increase to a Medium - high significance. Potential future mines starting up in the area will also contribute to increased noise levels

Noise levels from the proposed Kangala project must therefore be monitored on a monthly basis to determine potential sources of noise, increases and decreases in noise levels, and determine level of mitigation required. Once it is assessed that the mitigation measures have successfully decreased the specific noise from the proposed project the monitoring should then be carried out on a quarterly basis. A grievance mechanism should be introduced whereby receptors and people in the area can may a complaint regarding noise levels. In this event each complaint is to be investigated to determine the source and possible noise reduction measures. The grievance mechanism forms part of the public participation programme.

When the coal from the proposed Kangala project area has been mined, processed and decommissioned, overall ambient levels will decrease and the cumulative impacts in the area could improve.

10 KNOWLEDGE GAPS

Due to the nature of the environmental noise impact assessment as well as that all baseline noise measurements were carried out to satisfactory requirements, no knowledge gaps were identified.

11 ENVIRONMENTAL MONITORING PROGRAMME

It is recommended that the monitoring plan be implemented to determine potential sources of noise, increases and decreases in noise levels, and determine level of mitigation required. Components to be included in the proposed monitoring plan are discussed below.

Baseline noise monitoring is to be conducted on a monthly basis for the first 3 months to determine the impact of the noise levels on the relevant receptors as well as determine the level of mitigation. Once it is established that the mitigation measures have decreased the specific noise levels from the mining activities, the noise monitoring should be carried out on a quarterly basis thereafter. The noise measurements should be taken at the locations shown in Plan 1. A report must be compiled monthly/quarterly, depending on the intervals of the monitoring programme then submitted to management to ascertain compliance with the required standards. Mine management should be advised of any significant increase in the ambient sound level as operations continue. The measurement points must take into account noise sensitive receptors, such as farmsteads, schools, hospitals, churches etc. and only sensitive areas within a radius of two kilometres from the mining activities will be taken into account. The reason for the two kilometre buffer zone is in accordance to the Concawe method (SANS 10357) of calculating noise propagation. At each measurement point the ambient noise level will be sampled in terms of the following parameters:

- The A-weighted equivalent sound pressure level (LAeq) for duration not less than 30 minutes per monitoring point.

- Measurements to be taken during both daytime (06:00 to 22:00) and the night time (22:00 to 06:00).

12 CONCLUSION

With regards to the baseline assessment, the day and night time noise levels are primarily what is to be expected from a rural area. Most of the results are below or slightly above the SANS 10103:2008 guidelines. The few noise levels that were slightly above were due to noise associated with vehicular activity as well as the Leeufontein Colliery influencing the night time noise levels at receptor UN5.

It is expected that during the operational phase the noise levels generated by the mining activities will impact on the ambient noise level at receptors UN1, UN2, UN6, UN7 and UN9 during the night time (see Appendix B).

It is expected that the blasting activities will impact on receptors UN1, UN2, UN6, UN7 and UN9. The identified mining activities throughout the decommissioning phase will have a low significance of impact on most of the receptors.

13 REFERENCES

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

South African National Standard - Code of practice, SABS 0357:2004, *The Calculation of Sound Propagation by the Concawe Method.*

National Environmental Management Act, Act no 107 of 1998

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

National Conservation Act, Act 73 of 1989

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

Brüel & Kjær, Sound & Vibration Measurement A/S. *Environmental Noise,* 2001

Sound Fighter Systems 2007, Sound Fighter Systems USA, Shreveport, Los Angeles, viewed 22 October 2009, < http://www.soundfighter.com/content.asp?page=20 >

Appendix A: CV

Environmental Solutions Provider
Co. Reg. No. 1999/05985/07

Digby Wells & Associates (Pty) Ltd
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359 Pretoria Ave
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Tel: +27 11 789 9495
Fax: +27 11 789 9498
Email: info@digbywells.co.za

SPECIALIST DECLARATION OF INDEPENDENCE

I, Lukas Sadler, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed project Universal Coal, Kangala Mine;
- 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 no 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 specalist

Digyb Wells & Associates
Name of company

Signature of the specialist

02 Nov. 09
Date

Lukas Sadler

Lukas Sadler
Environmental Consultant
Digby Wells and Associates

EDUCATION
2002 – 2004: BCom Environmental Management (North West University)
2009: Short course in Occupational and Environmental Noise

PROFESSIONAL AFFILIATIONS
The National Association for Clean Air (NACA)

EMPLOYMENT

May 2006 – July 2007:	West View Rail (pty) ltd (London)
November 2007 - Present:	Digby Wells and Associates

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.

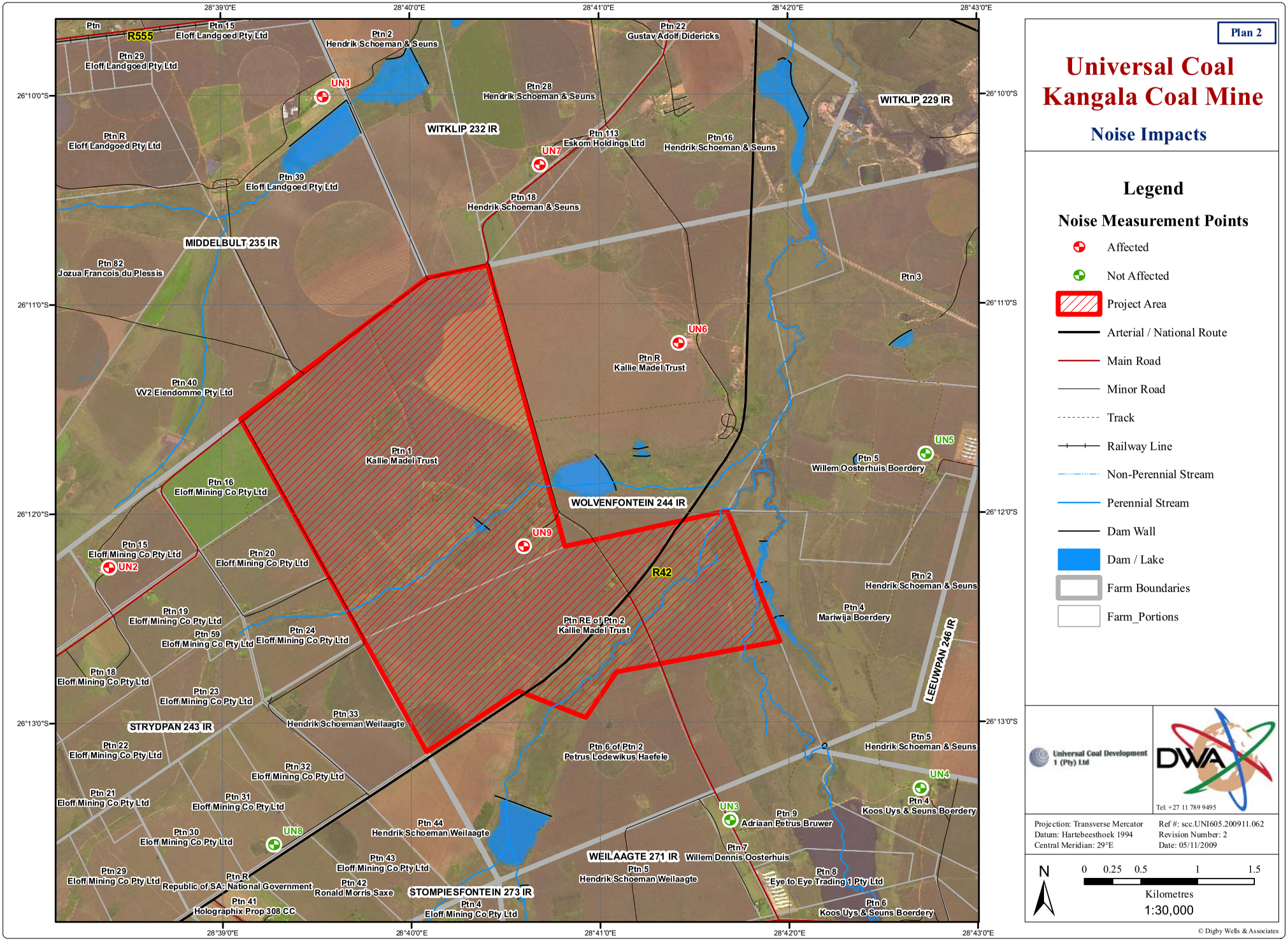
My duties as a Platelayer was reconstructing old track infrastructure and to re-rail, replacing old tracks. During my time with West View Rail (pty) ltd I went on varies courses namely the 'Track Accustomed' course, which allowed me to work near rails where the power was still on and trains would still be operational. I also went on a 'Passport to Safety' course, which is a health and safety course relating to construction sites, especially the track environment.

I am currently working at Digby Wells and Associates in the Biophysical Department, where I am responsible for the Air Quality and Noise Impact Assessments relating to EIA/EMP's, as well as assisting with the compilation of reports such as environmental impact assessments.

PAST PROJECTS

- Xstrata, Mpumulanga: Duiker 15 – Air Quality Impact Assessment
- Xtrata, Mpumulanga: Spitzkop – Environmental Noise Impact Assessment
- Xtrata, Mpumulanga: Tselentis – Environmental Noise Impact Assessment
- Mineral Corporation, Mpumalanga : Bankfontein – Air Quality and Noise Impact Assessments
- Mashala Resources, Mpumalanga : Dust fallout monitoring programme

Appendix B: Affected receptors


Plan 2
Universal Coal
Kangala Coal Mine
Noise Impacts
Legend
Noise Measurement Points
Affected
Not Affected
Project Area
Arterial / National Route
Main Road
Minor Road
Track
Railway Line
Non-Perennial Stream
Perennial Stream
Dam Wall
Dam / Lake
Farm Boundaries
Farm_Portions
UN1
UN2
UN3
UN4
UN5
UN6
UN7
UN8
UN9
R555
R42
WITKLIP 232 IR
WITKLIP 229 IR
MIDDELBULT 235 IR
WOLVENFONTEIN 244 IR
STRYDPAN 243 IR
WEILAAGTE 271 IR
STOMPIESFONTEIN 273 IR
LEEUWPAN 246 IR
Ptn 1 Kallie Madel Trust
Ptn RE of Ptn 2 Kallie Madel Trust
Ptn R Kallie Madel Trust
Ptn 2 Hendrik Schoeman & Seuns
Ptn 3
Ptn 4 Mariwija Boerdery
Ptn 5 Willem Oosterhuis Boerdery
Ptn 6 of Ptn 2 Petrus Lodewikus Haefele
Ptn 15 Eloff Landgoed Pty Ltd
Ptn 16 Eloff Mining Co Pty Ltd
Ptn 20 Eloff Mining Co Pty Ltd
Ptn 40 VV2 Eiendomme Pty Ltd
Ptn 82 Jozua Francois du Plessis
Ptn 22 Gustav Adolf Didericks
Ptn 28 Hendrik Schoeman & Seuns
Ptn 113 Eskom Holdings Ltd
Ptn 16 Hendrik Schoeman & Seuns
Ptn 18 Hendrik Schoeman & Seuns
Ptn 39 Eloff Landgoed Pty Ltd
Ptn R Eloff Landgoed Pty Ltd
Ptn 29 Eloff Landgoed Pty Ltd
Ptn 19 Eloff Mining Co Pty Ltd
Ptn 59 Eloff Mining Co Pty Ltd
Ptn 24 Eloff Mining Co Pty Ltd
Ptn 18 Eloff Mining Co Pty Ltd
Ptn 23 Eloff Mining Co Pty Ltd
Ptn 33 Hendrik Schoeman Weilaagte
Ptn 22 Eloff Mining Co Pty Ltd
Ptn 32 Eloff Mining Co Pty Ltd
Ptn 21 Eloff Mining Co Pty Ltd
Ptn 31 Eloff Mining Co Pty Ltd
Ptn 30 Eloff Mining Co Pty Ltd
Ptn 44 Hendrik Schoeman Weilaagte
Ptn 43 Eloff Mining Co Pty Ltd
Ptn 29 Eloff Mining Co Pty Ltd
Ptn R Republic of SA: National Government
Ptn 42 Ronald Morris Saxe
Ptn 41 Holographix Prop 308 CC
Ptn 4 Eloff Mining Co Pty Ltd
Ptn 9 Adriaan Petrus Bruwer
Ptn 7 Willem Dennis Oosterhuis
Ptn 5 Hendrik Schoeman Weilaagte
Ptn 8 Eye to Eye Trading 1 Pty Ltd
Ptn 6 Koos Uys & Seuns Boerdery
Ptn 4 Koos Uys & Seuns Boerdery
Ptn 5 Hendrik Schoeman & Seuns
Ptn 2 Hendrik Schoeman & Seuns
26°10'0"S
26°11'0"S
26°12'0"S
26°13'0"S
28°39'0"E
28°40'0"E
28°41'0"E
28°42'0"E
28°43'0"E
Universal Coal Development 1 (Pty) Ltd
DWA
Tel: +27 11 789 9495
Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 29°E
Ref #: scc.UNI605.200911.062
Revision Number: 2
Date: 05/11/2009
N
0 0.25 0.5 1 1.5
Kilometres
1:30,000
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