ENVIRONMENTAL NOISE ASSESSMENT FOR THE PROPOSED PLATREEF UNDERGROUND MINE

PLATREEF RESOURCES (PTY) LTD

OCTOBER 2013

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This document has been prepared by **Digby Wells Environmental**.

Report Title: **Environmental Noise Impact Assessment for the proposed Platreef Underground Mine**

Project Number: **PLA1677**

Name	Responsibility	Signature	Date
Lukas Sadler	Report writer		16/09/2013
Bradly Thornton	1st review		01/10/2013

EXECUTIVE SUMMARY

Platreef Resources (Pty) Ltd (Platreef) is the holder of a prospecting right registered in the Mineral and Petroleum Titles Registration Office under MPT 55/2006 PRC, prospecting right LP30/5/111/2/872PR over the farms Macalacaskop 243 KR and Turfspruit 241 KR. Platreef holds the exclusive prospecting rights to prospect for its own account for Precious Metals and Base Minerals within the defined area.

Digby Wells was commissioned by Platreef to conduct a noise assessment for the proposed Platreef Mining Project in the Waterberg District Municipality of the Limpopo province in South Africa. 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 agricultural, including cattle and subsistence farming. The approach used in investigating noise impacts is based on guidelines provided by the South African National Standards (SANS 10103:2008). The following legislation was considered for this survey:

- The National Environmental Management Act (Act 107 of 1998), NEMA;
- The National Environmental Management Air Quality Act (Act 39 of 2004), NEMAQA; and
- The Environment Conservation Act, 1989 (Act 73 of 1989).

This environmental noise assessment report entails the following tasks:

- Identification of noise sources and potential noise sensitive receivers;
- Establishment of the existing soundscape at the surrounding communities 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. The impact of the proposed project is assessment by means of noise dispersion modelling.

In terms of the baseline conditions, it is gathered that the existing ambient noise levels in the immediate area are characteristic of suburban surroundings with noise levels ranging from 45 dBA to 52 dBA.

It is concluded that the blasting activities during construction will impact on Kgubudi, Magongwa and Mzumbani when blasting occurs at Shaft 1, shaft 3 and shaft 4 respectively. The blasting noise impact at Mzumbani may be less significant depending on whether the berm will be in place when blasting takes place at shaft 4.

The continuous noise activities during construction as well as operational phase will not impact on the surrounding communities because of the already high baseline levels as well as the major noise sources from the mining activities is expected to be limited to site. The impact therefore has a low significance rating. With effective mitigation measures in place the impact can further be reduced. It is recommended that Platreef opt for the construction

and operation of TSF site 2 because it has the least significant impact on the surrounding communities during the construction phase.

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LIST OF ACCOUSTIC TERMS

A-weighted sound level	A measure of sound pressure level designed to reflect the acuity of the human ear.
Decibel (dB)	A unit in which sound pressure is measured.
dBA	Unit of sound level. The weighted sound pressure level by the use of the A metering characteristic, which allows the sound pressure level to be measured at the approximate sensitivity as the human ear
$L_{Aeq,T}$	Is the value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval T_m, has the same mean-square sound pressure as a sound under consideration whose level varies with time.
Noise sensitive receptors	Permanent or seasonal residences; hotels/motels; schools and day-cares; hospitals and nursing homes; places of worship; parks and campgrounds

1 INTRODUCTION

Platreef Resources (Pty) Ltd (Platreef) is the holder of a prospecting right registered in the Mineral and Petroleum Titles Registration Office under MPT 55/2006 PRC, prospecting right LP30/5/111/2/872PR over the farms Macalacaskop 243 KR and Turfspruit 241 KR. Platreef holds the exclusive prospecting rights to prospect for its own account for Precious Metals and Base Minerals within the defined area.

Platreef is investigating the construction and operation of an underground Platinum mine. The project is a greenfields project in an area where the current land use is agriculture. The surface infrastructure planned includes a shaft and a process plant with supporting infrastructure and facilities such as access roads, pipelines and power. The current infrastructure does not include a smelter. In fulfilment of the requirements stipulated in Section 39 of the Minerals and Petroleum Resources Development Act (MPRDA), an Environmental Impact Assessment (EIA) process for the proposed project is being undertaken.

This environmental noise impact assessment report is intended to be included in the EIA, and not to be a standalone document. Its purpose is to provide insight into the existing soundscape of the area and subsequently what impact the project will have on the surrounding ambient noise levels of the area, especially on the surrounding noise sensitive receivers.

2 TERMS OF REFERENCE

Digby Wells was commissioned by Platreef to conduct a noise assessment for the proposed Platreef Mining Project in the Waterberg District Municipality of the Limpopo province in South Africa. 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 agricultural, including cattle and subsistence farming. The approach used in investigating noise impacts is based on guidelines provided by the South African National Standards (SANS 10103:2008). The following legislation was considered for this survey:

- The National Environmental Management Act (Act 107 of 1998), NEMA;
- The National Environmental Management Air Quality Act (Act 39 of 2004), NEMAQA; and
- The Environment Conservation Act, 1989 (Act 73 of 1989).

The Environmental Noise Impact Assessment report will include a baseline study, predicted noise impacts on the identified noise sensitive receivers, during the various project phases as well as recommendations and mitigation measures for potential impacts.

3 STUDY AREA

The Platreef Project is located in the Northern Limb of the Bushveld Igneous Complex and entails the underground mining of Platinum Group Metals (PGMs). The project area is located approximately 280km northeast of Johannesburg and 10km north of the town of Mokopane in the Limpopo Province, South Africa. The project area falls within the Mogalakwena Local Municipality in the Waterberg District Municipality.

The farms forming part of the proposed project include the following:

- Turfspruit 241 KR;
- Macalacaskop 243 KR; and
- Rietfontein 2 KS.

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 platinum mining activities on the surrounding environment.

6 METHODOLOGY

The approach used in investigating noise impacts is based on the noise control regulations as published under PN24 of 1998 (PG 35 of 24 April 1998) 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]
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 $L_{R,dn}$ 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, 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 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 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 LReq,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

Excess ($\Delta L_{Req,T}$)[a] dBA	Estimated community/group response	
	Category	Description
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.		

A baseline assessment was undertaken to determine the current ambient noise levels at the surrounding areas of the proposed project. The criteria that were used for the siting of the measurement locations were:

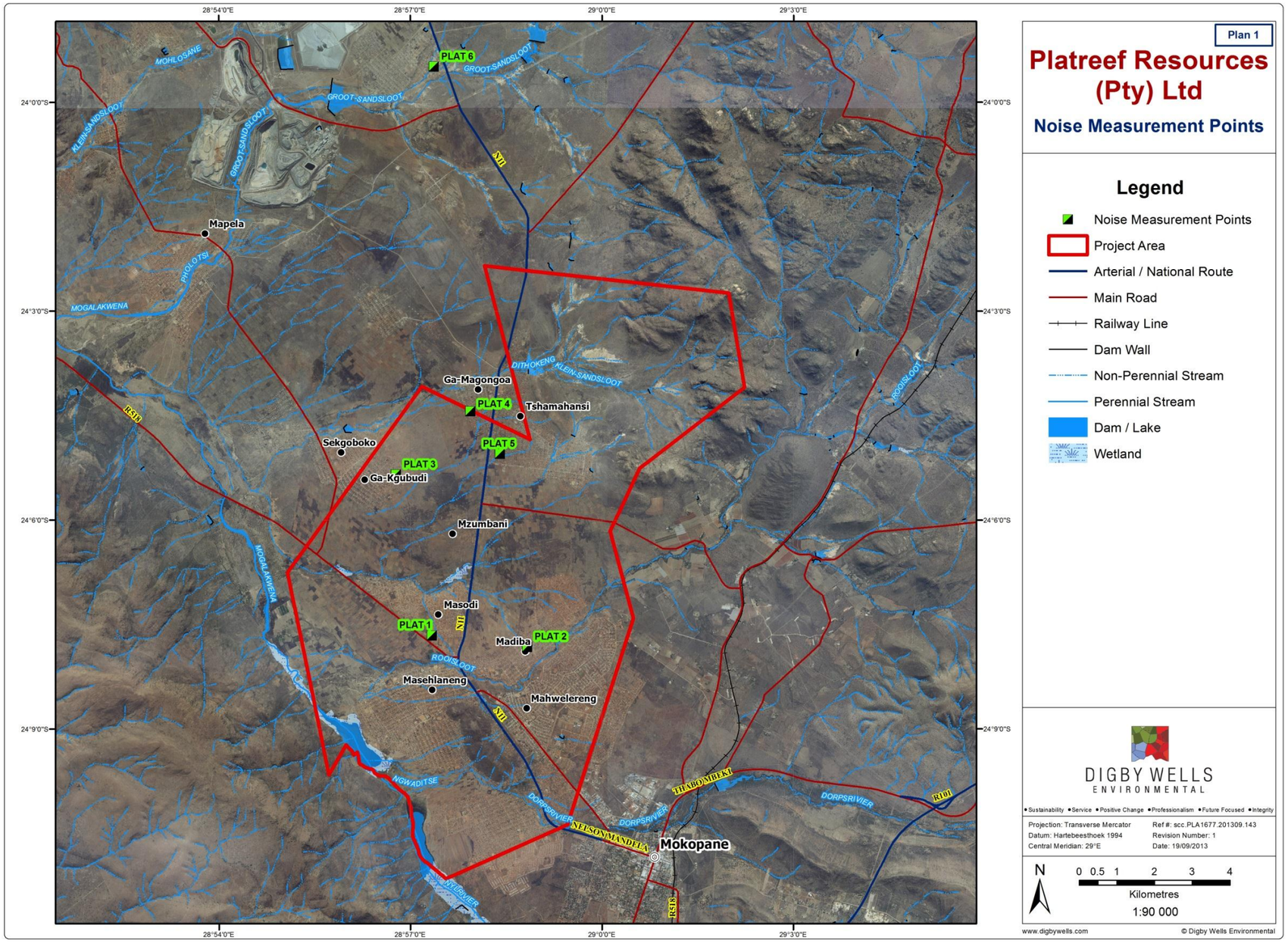
- The locations were the nearest noise sensitive receptors surrounding the proposed Platreef mining project and subsequently the most likely to be impacted on by the proposed mining activities; and
- That they served as suitable reference points for the measurement of ambient sound levels surrounding the proposed project area. The noise measurement locations cover the surrounding communities that represent a comprehensive soundscape of the area.

The list of noise measurement locations can be seen in Table 6-3. 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 locations are presented in Table 6-3 as well as on below. Photos of the measurement locations are presented in Figure 6-1 to Figure 6-6.

Table 6-3: Noise measurement locations

ID	Receptor	Receptor type	GPS coordinates
Plat 1	Masodi	Suburban community with little road traffic	24° 7'41.31"S 28°57'19.21"E
Plat 2	Madiba	Suburban community with little road traffic	24° 7'48.53"S 28°58'49.29"E
Plat 3	Kgubudi	Suburban community with little road traffic	24° 5'20.37"S

ID	Receptor	Receptor type	GPS coordinates
			28°56'47.33"E
Plat 4	Magongwa	Suburban community with little road traffic	24° 4'26.58"S 28°57'58.14"E
Plat 5	Tshamahansi	Suburban community with little road traffic	24° 5'3.44"S 28°58'22.78"E
Plat 6	Molekana	Suburban community with little road traffic	23°59'29.35"S 28°57'22.32"E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28°57'0"E
29°0'0"E
29°3'0"E
24°0'0"S
24°3'0"S
24°6'0"S
24°9'0"S
PLAT 6
PLAT 4
PLAT 5
PLAT 3
PLAT 1
PLAT 2
Mapela
Ga-Magongoa
Tshamahansi
Sekgoboko
Ga-Kgubudi
Mzumbani
Masodi
Madiba
Masehlaneng
Mahwelereng
Mokopane
MOHLOSANE
KLEINSANDSLOOT
GROOTSANDSLOOT
MOGALAKWENA
PHOLOTSI
DITHOKENG
ROOISLOOT
NGWADITSE
DORPSRIVIER
N11
R518
R101
THABOMBELKT
NELSONMANDELA
Plan 1
Platreef Resources (Pty) Ltd
Noise Measurement Points
Legend
Noise Measurement Points
Project Area
Arterial / National Route
Main Road
Railway Line
Dam Wall
Non-Perennial Stream
Perennial Stream
Dam / Lake
Wetland
DIGBY WELLS ENVIRONMENTAL
Sustainability Service Positive Change Professionalism Future Focused Integrity
Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 29°E
Ref #: scc.PLA1677.201309.143
Revision Number: 1
Date: 19/09/2013
N
0 0.5 1 2 3 4
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Figure 6-1: Location of noise measurement at Masodi

Figure 6-2: Location of noise measurement at Madiba

Figure 6-3: Location of noise measurement at Kgubudi

Figure 6-4: Location of noise measurement at Magongwa

Figure 6-5: location of noise measurement at Tshamahansi

Figure 6-6: location of noise measurement at Molekana

Predictive modelling was performed for the proposed 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 models were run as a conservative scenario with worst case assumptions, so the following should be noted:

- The average yearly temperature was used;
- The average yearly humidity was used;
- Calm wind conditions were used; and
- The mitigation effect of vegetation was not taken into account.

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 continuous noise causing sources

Noise source	Sound power levels dB						
Octave band frequencies, Hz	63	125	250	500	1000	2000	4000
Construction phase							
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
Drill	109	118	113	113	113	112	110
Dozer	110	122	113	114	110	108	104
Operational phase							
Processing plant (cumulative including milling operation)	108	106	107	103	99	94	86
Ventilation shafts	117	114	116	110	108	107	104

The blasting noise levels were calculated according to the SANS 10357:2004 - The calculation of sound propagation by the Concawe method. Table 6-5 below represents the power levels used in the calculation.

Table 6-5: Sound power levels from blasting activities

Noise source	Sound power levels dB						
Octave band frequencies, Hz	63	125	250	500	1000	2000	4000
Blasting	124	126	127	125	123	120	117

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

If the predicted noise levels measure above the existing baseline levels then the difference in dBA levels will be compared to the SANS guideline (Table 6-2) to establish the categories of community/group response to the noise increase with regards to noise disturbance. According to *Brüel & Kjær.2001* as well as with reference to Table 6-2, an increase of about 8 -10 dBA is required before the sound subjectively appears to be significantly louder.

7 BASELINE RESULTS AND DISCUSSIONS

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.

Table 7-1: Results of the baseline noise measurements

Sample ID	SANS rating limit			Measurement details		
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$ dBA	Maximum/Minimum dBA	Date
Plat 1	Suburban	Daytime	50	48	75 / 36	07/11/2011
		Night time	40	44	65 / 41	07/11/2011
Plat 2	Suburban	Daytime	50	47	75 / 33	08/11/2011
		Night time	40	43	66 / 27	08/11/2011
Plat 3	Suburban	Daytime	50	46	73 / 32	09/11/2011
		Night time	40	45	64 / 36	09/11/2011
Plat 4	Suburban	Daytime	50	51	79 / 33	10/11/2011
		Night time	40	52	70 / 30	10/11/2011
Plat 5	Suburban	Daytime	50	47	71 / 37	11/11/2011
		Night time	40	45	68 / 33	11/11/2011
Plat 6	Suburban	Daytime	50	28	80 / 20	22/08/2013
		Night time	40	27	65 / 20	22/08/2013
	Indicates $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

Plat 1

The measurement was taken in the Masodi community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts.

The night time ambient Leq levels measured above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts. The ambient night time noise levels are characterised by the continuous noise from the *Gryllidae* (crickets) at this location.

Plat 2

The measurement was taken in the Madiba community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts.

The night time ambient Leq levels measured above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts. The ambient night time noise levels are characterised by the continuous noise from the *Gryllidae* (crickets) at this location.

Plat 3

The measurement was taken in the Kgubudi community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts.

The night time ambient Leq levels measured above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts. The ambient night time noise levels are characterised by the continuous noise from the *Gryllidae* (crickets) at this location.

Plat 4

The measurement was taken in the Magongwa community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured above the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts. Ambient day time noise levels are characterised by the intermittent noise from the livestock (roosters crowing) at this location.

The night time ambient Leq levels measured above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts. The ambient night time noise levels are characterised by the continuous noise from the *Gryllidae* (crickets) at this location.

Plat 5

The measurement was taken in the Tshamahansi community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts.

The night time ambient Leq levels measured above the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts. The ambient night time noise levels are characterised by the continuous noise from the *Gryllidae* (crickets) at this location.

Plat 6

The measurement was taken in the Molekana community. Based on the daytime results from the noise measurements it is noted that the Leq levels measured below the SANS guidelines for the maximum allowable outdoor daytime limit for ambient noise in suburban districts.

The night time ambient Leq levels measured below the SANS guidelines for the maximum allowable outdoor limit for night time ambient noise in suburban districts.

The noise sources that were influencing the baseline measurements at the time of the noise survey and that were responsible for the day/night time measurements are summarised in Table 7-2.

Table 7-2: Summary of noise sources influencing baseline measurements around the proposed site

Noise source description				
ID	**Day**	**Duration**	**Night**	**Duration**
Plat 1	Vehicular traffic (did not cause noise levels to measure above SANS guideline)	Continuous	*Gryllidae* (crickets)	Continuous
Plat 2	Vehicular traffic (did not cause noise levels to measure above SANS guideline)	Intermittent	*Gryllidae* (crickets)	Continuous
Plat 3	Vehicular traffic (did not cause noise levels to measure above SANS guideline)	Intermittent	*Gryllidae* (crickets)	Continuous
Plat 4	Livestock (roosters crowing)	Intermittent	*Gryllidae* (crickets)	Continuous
Plat 5	Vehicular traffic (did not cause noise levels to measure above SANS guideline)	Continuous	*Gryllidae* (crickets)	Continuous

Noise source description				
ID	**Day**	**Duration**	**Night**	**Duration**
Plat 6	Vehicular traffic (did not cause noise levels to measure above SANS guideline)	Intermittent	*Gryllidae* (crickets)	Continuous

8 FINDINGS

8.1 The findings for the various phases

The findings present the results of the predictive modelling, which subsequently indicates the noise attenuation from the proposed mining activities in relation to all the surrounding communities.

8.1.1 Construction phase

It is assumed that the construction activities will only take place during daylight hours, therefore the noise contribution from the proposed activities will only be compared to the existing ambient daytime noise levels as well as compared to the daytime SANS guideline limits.

The following proposed activities during the construction phase are identified as possible continuous noise sources and may impact on the ambient noise level of the area:

- Site clearing;
- Construction of surface infrastructure (haul roads, conveyors, processing plant and site offices) and
- Sinking of vertical and ventilation shafts.

Potential impact: The construction machinery involved with the site clearing, construction of the ground level embankments of the Tailings Storage Facility (TSF), depositing overburden material onto berm and stockpiles as well as the drilling activities for the sinking of the shafts will be a source of continuous noise throughout the construction phase. The blasting activities, seen as an impulsive noise type, are expected to produce the highest levels but it will be intermittent during the construction phase.

The grid noise map, shown in Plan 2, presents the noise contour lines and visually indicates the noise propagation during the construction phase. According to the noise dispersion model for the construction phase, the noise from the construction of TSF site 1, site 2, site 3 and the plant will not measure above the current ambient daytime noise levels at the surrounding communities respectively. The noise levels from the above mentioned activities will also not measure above the SANS daytime suburban rating limits of 50dBA at any of the surrounding communities.

The current ambient daytime noise levels at Masodi, Madiba, Kgubudi, Magongwa, Tshamahansi and Molekana are 48 dBA, 47 dBA, 46 dBA, 51 dBA, 47 dBA and 28 dBA

respectively. The specific noise levels expected from the proposed operational activities will only measure between 45 dBA and 50 dBA at the mentioned communities. The expected noise levels from the proposed mining activities will therefore not impact on the mentioned communities due to the existing ambient noise levels being higher than the expected construction noise levels from mainly the construction machinery.

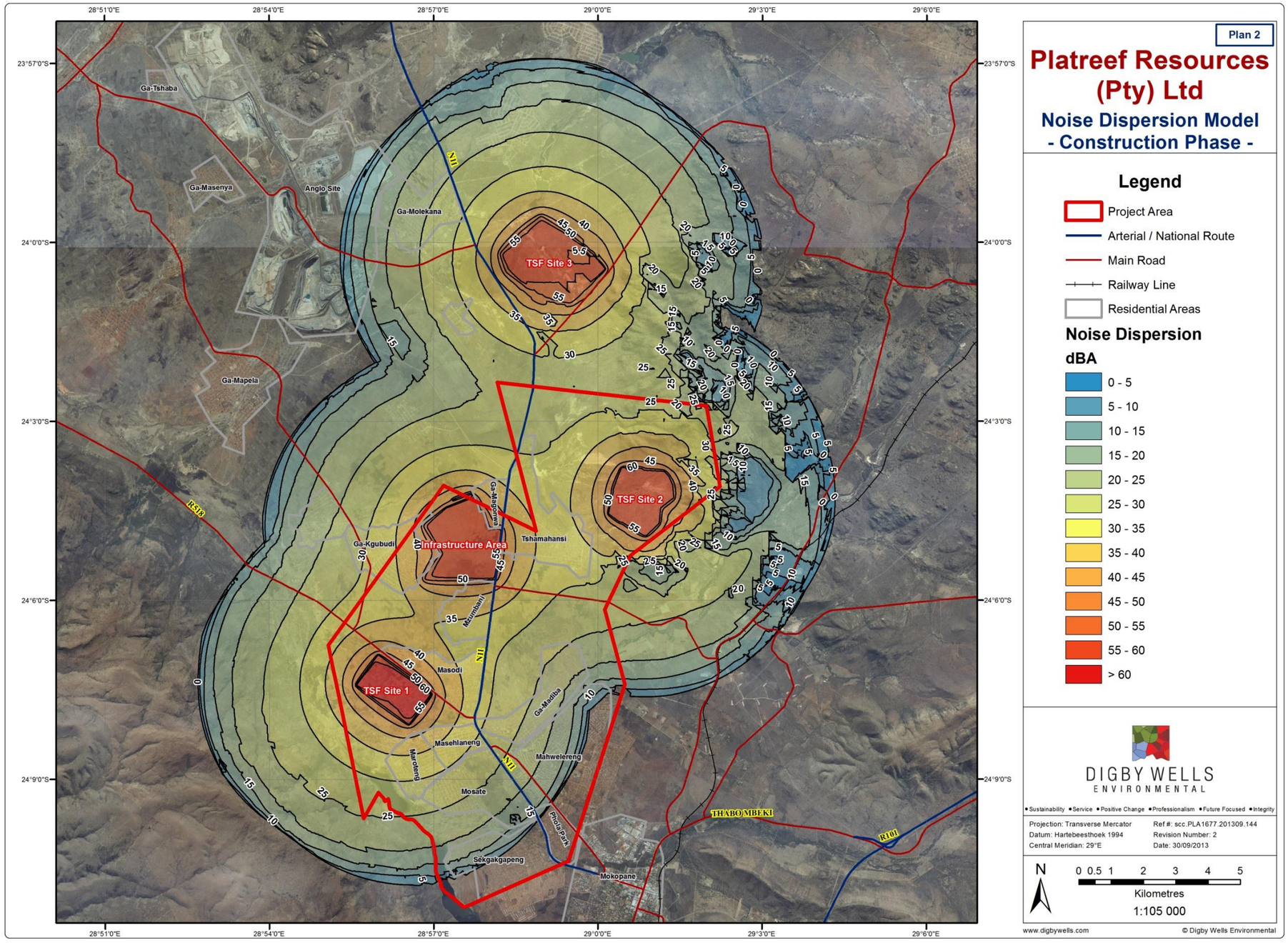
The blasting propagation was calculated separately because it will occur intermittently compared to the other before mentioned construction activities. The calculation was performed according to the SANS 10357:2004 - The calculation of sound propagation by the Concawe method. Table 8-1 below represent the noise levels from the blasting at the surrounding communities.

Table 8-1: Blasting noise levels at the surrounding communities

Community	Baseline level (dBA)	Blasting noise level dBA			
		Shaft 1	Shaft 2	Shaft 3	Shaft 4
Ga-Magongwa	51	58	60	64	52
Tshamahansi	47	54	54	52	53
Mzumbani	48	52	50	54	60
Kgubudi	46	58	55	56	58

With reference to Table 6-2 the following scenarios will cause strong community response because of the expected blasting levels measuring 10dBA or more above the existing baseline:

- At Kgubudi when blasting takes place at shaft 1;
- At Magongwa and Kgubudi when blasting takes place at shaft 3
- At Mzumbani and Kgubudi when blasting takes place at shaft 4. The impact will be less significant at Mzumbani if the southern berm is in place by the time blasting occurs at shaft 4.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24°9'0"S
Ga-Tshaba
Ga-Masenya
Anglo Site
Ga-Molekana
Ga-Mapela
TSF Site 3
TSF Site 2
TSF Site 1
Infrastructure Area
Ga-Kgubudi
Tshamahansi
Ga-Mampuru
Mamphahlwa
Masodi
Ga-Madiba
Masehlaneng
Maroteng
Mahwelereng
Mosate
Sekgakgapeng
Mokopane
Phola Park
THABO MBEKI
N11
R518
R101
Plan 2
Platreef Resources (Pty) Ltd
Noise Dispersion Model
- Construction Phase -
Legend
Project Area
Arterial / National Route
Main Road
Railway Line
Residential Areas
Noise Dispersion
dBA
0 - 5
5 - 10
10 - 15
15 - 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 45
45 - 50
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55 - 60
> 60
DIGBY WELLS ENVIRONMENTAL
Sustainability Service Positive Change Professionalism Future Focused Integrity
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Revision Number: 2
Date: 30/09/2013
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8.1.2 Operational phase

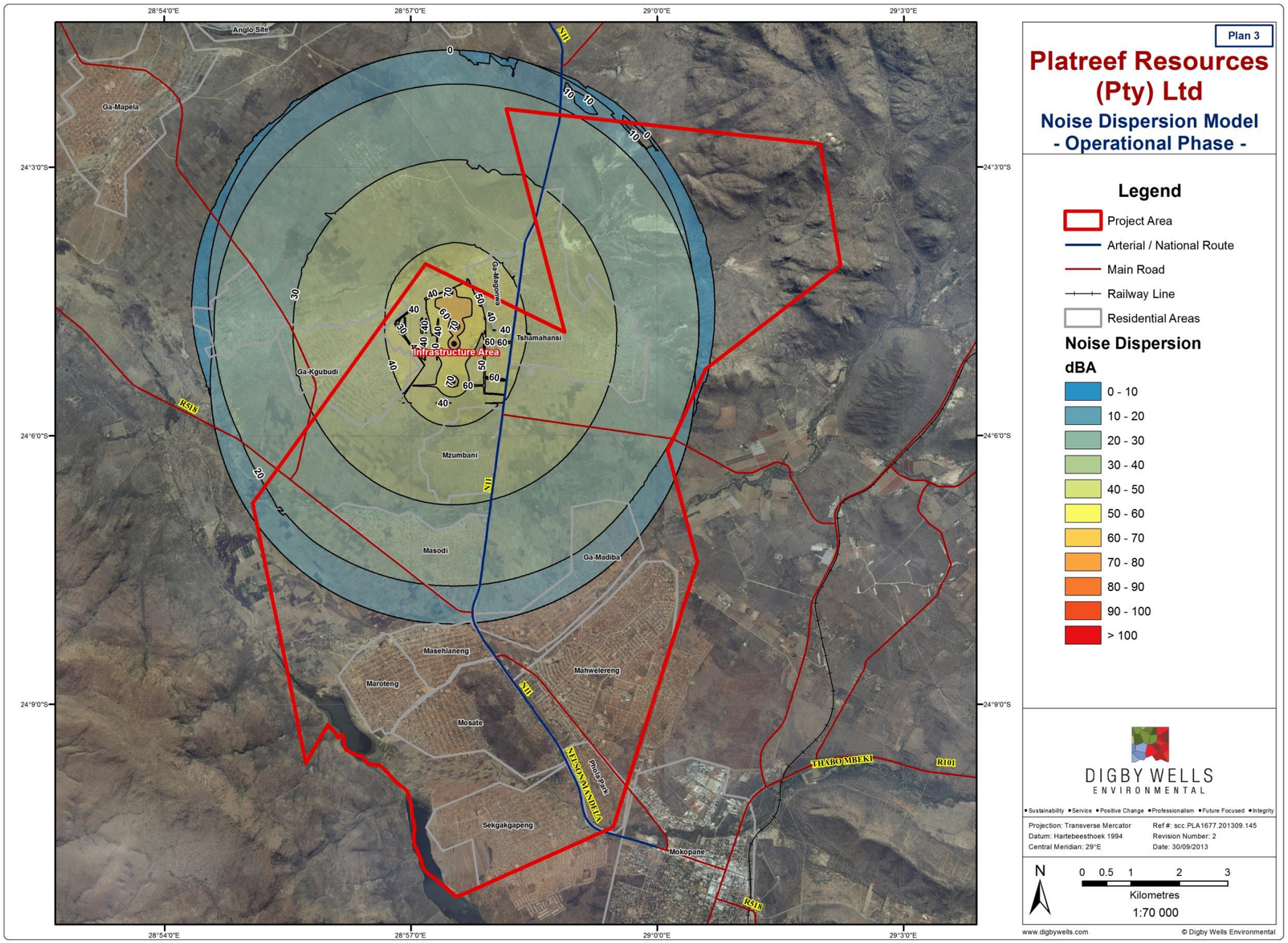
The following proposed activities during the operational phase are identified as possible noise sources and may impact on the ambient noise level at the relevant noise sensitive receivers:

- Operation and maintenance of conveyors, processing plant, milling operations and haul roads; and
- Operation and maintenance of shafts.

Potential impact: The vent shafts and plant area will be a source of continuous noise in terms of the mining activities and the processing plant including milling activities will be a source of continuous noise in terms of the processing activities.

The grid noise map, shown in Plan 3, presents the noise contour lines and visually indicates the noise propagation during the operational phase for the day and night time. According to the noise dispersion model for the operational phase, the noise from the proposed vent shafts and processing activities is expected not to measure above the current ambient noise levels at the surrounding communities.

The current ambient daytime noise levels at Kgubudi, Magonwa and Tshamahansi are 46 dBA, 51 dBA and 47 dBA respectively. The current ambient night time levels are 45 dBA, 52 dBA and 45 dBA respectively. The specific noise levels expected from the proposed operational activities will only measure between 40 dBA and 45 dBA at the mentioned communities. The expected noise levels from the proposed mining activities will therefore not impact on the mentioned communities.


28°54'0"E
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29°0'0"E
29°3'0"E
24°3'0"S
24°6'0"S
24°9'0"S
Anglo Site
Ga-Mapela
Ga-Nkgoroma
Tshamahansi
Infrastructure Area
Ga-Kgubudi
Mzumbani
Masodi
Ga-Madiba
Masehlaneng
Maroteng
Mahwelereng
Mosate
Sekgakgapeng
Phola Park
Mokopane
N11
R518
R101
THABO MBEKI
NELSON MANDELA
0
10
20
30
40
50
60
Plan 3
Platreef Resources (Pty) Ltd
Noise Dispersion Model
- Operational Phase -
Legend
Project Area
Arterial / National Route
Main Road
Railway Line
Residential Areas
Noise Dispersion
dBA
0 - 10
10 - 20
20 - 30
30 - 40
40 - 50
50 - 60
60 - 70
70 - 80
80 - 90
90 - 100
> 100
DIGBY WELLS
ENVIRONMENTAL
Sustainability Service Positive Change Professionalism Future Focused Integrity
Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 29°E
Ref #: scc.PLA1677.201309.145
Revision Number: 2
Date: 30/09/2013
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Kilometres
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www.digbywells.com
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8.1.3 Decommissioning phase

It is assumed that the decommissioning activities will only take place during daylight hours. The following activities during the decommissioning phase are identified as possible noise sources and may impact on the ambient noise level at the relevant noise sensitive receivers:

- Demolishing and removal of infrastructure; and
- Rehabilitation activities (Spreading of soil, re-vegetation & profiling/contouring).

Potential impact: The machinery involved with the above mentioned activities will be a source of continuous noise throughout the decommissioning phase.

The impact during the decommissioning phase is expected to be lower than both that of the construction and operational phases due to the limited activities, therefore it is probable that the noise from the proposed rehabilitation activities will be lower to that of the current ambient noise levels at the indicated noise sensitive receivers.

9 IMPACT ASSESSMENT

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model.

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence (21) x Probability (7)

Where: Consequence = Severity (7) + Spatial Scale (7) + Duration (7)

And: Probability = Likelihood of an impact occurring (7)

The matrix calculates the significance rating out of 147, whereby Severity, Spatial Scale, duration and probability are each given a rating out of seven as indicated in Table 9-1. The weight assigned to the various parameters for positive and negative impacts in the formula.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in the EMP. The significance of an impact is then determined and categorised into one of four categories, as indicated in Table 9-3, which is extracted from Table 9-2.

Table 9-1: Impact assessment parameter ratings

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	***Social, cultural and heritage***			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures/ natural process will reduce the impact after implementation.	Certain/ Definite. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	National Will affect the entire country	Permanent: Mitigation Mitigation measures of natural process will reduce the impact.	Almost certain/Highly probable 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 rehabilitate	Very serious widespread social impacts. Irreparable damage to highly valued items	Province/ Region Will affect the entire province or region	Project Life The impact will cease after the operational life span of the project.	Likely The impact may occur.
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	Municipal Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem	On-going social issues. Damage to items of	Local Local extending	Medium term	Unlikely Has not happened yet but could

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	***Social, cultural and heritage***	**Spatial scale**	**Duration**	**Probability**
	function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	cultural significance.	only as far as the development site area	1-5 years	happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable 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
1	Limited damage to minimal area of low significance that will have no impact on the environment.	Low-level repairable damage to commonplace structures.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen.

Table 9-2: Probability X Consequence Matrix

Significance										
		Consequence (severity + scale + duration)								
		1	3	5	7	9	11	15	18	21
Probability / Likelihood	1	1	3	5	7	9	11	15	18	21
	2	2	6	10	14	18	22	30	36	42
	3	3	9	15	21	27	33	45	54	63
	4	4	12	20	28	36	44	60	72	84
	5	5	15	25	35	45	55	75	90	105
	6	6	18	30	42	54	66	90	108	126
	7	7	21	35	49	63	77	105	126	147

Table 9-3: Significance threshold limits

Significance		
High	108- 147	
Medium-High	73 - 107	
Medium-Low	36 - 72	
Low	0 - 35	

9.1 Construction phase

Impact assessment for continuous construction activities

CRITERIA	DETAILS/DISCUSSION				
Activities	• Site clearing; • Construction of surface infrastructure (haul roads, conveyors, milling equipment, processing plant and site offices) and • Sinking of vertical/decline and ventilation shafts (earthworks).				
Description of impact	The equipment and machinery involved such as excavators, bulldozers and haul trucks may impact on the surrounding ambient noise levels at the noise sensitive receivers near the project area				
Mitigation required	• As far as possible keep constructions 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. installed exhaust mufflers; • Switching off equipment when not in use; and • Fixed noise producing sources such as generators, pump stations to be either housed in enclosures or barriers put up around the noise source.				
Parameters	*Severity*	*Spatial*	*Duration*	*Probability*	*Significant rating*

CRITERIA	DETAILS/DISCUSSION				
Activities	• Site clearing; • Construction of surface infrastructure (haul roads, conveyors, milling equipment, processing plant and site offices) and • Sinking of vertical/decline and ventilation shafts (earthworks).				
		scale			
Pre-Mitigation	2	2	3	3	21
Post-Mitigation	2	2	3	2	14

Impact assessment for drilling and blasting activities

CRITERIA	DETAILS/DISCUSSION				
Activities	• Sinking of vertical/decline and ventilation shafts (drilling and blasting).				
Description of impact	The equipment and machinery involved such as excavators, bulldozers and haul trucks may impact on the surrounding ambient noise levels at the noise sensitive receivers near the project area				

Mitigation required	• 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, 1993);
	  ○ Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden (Sengupta, 1993); and
	  ○ Maintaining good public relations with the surrounding communities, i.e warning the local communities in advance before blasts.				

Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre-Mitigation	5	4	3	6	72
Post-Mitigation	4	3	3	5	50

9.2 Operational phase

Impact assessment

CRITERIA	DETAILS/DISCUSSION				
Activities	• Operation and maintenance of conveyors, processing plant, milling operations and haul roads; and • Operation and maintenance of shafts.				
Description of impact	The vent shaft and the processing plant including milling activities will be a source of continuous noise in terms of the processing activities.				
Mitigation required	• 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 • Fixed noise producing sources such as generators, pump stations to be either housed in enclosures or barriers put up around the noise source.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre-Mitigation	2	1	5	3	24
Post-Mitigation	2	1	5	2	16

9.3 Decommissioning phase

Impact assessment

CRITERIA	DETAILS/DISCUSSION				
Mining phase/s	• Removal of infrastructure; and • Rehabilitation activities (Spreading of soil, re-vegetation & profiling/contouring).				
Description of impact	The equipment and machinery involved such as excavators, bulldozers and haul trucks may impact on the surrounding ambient noise levels at the noise sensitive receivers near the project area				
Mitigation required	• As far as possible keep decommissioning 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. installed exhaust mufflers; • Switching off equipment when not in use; and • Fixed noise producing sources such as generators, pump stations to be either housed in enclosures or barriers put up around the noise source.				
Parameters	*Severity*	*Spatial scale*	*Duration*	*Probability*	*Significant rating*
Pre-Mitigation	1	1	2	2	8
Post-Mitigation	1	1	2	1	4

10 CUMULATIVE IMPLACTS

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 medium-low to low significance. Because of the lack of other major sources of noise in the immediate area of the proposed project as well as the low significance of the impact, the proposed project in isolation is not considered a significant contributor to the cumulative noise impacts to the area.

The nearest mining operations are 8km to the north of the proposed project, near the community of Molekana. The existing noise sources in the immediate area of the proposed project are limited to agricultural activities, vehicular movement on the N11 as well as the current exploration activities.

Potential future mines starting up in the area will contribute to ambient noise levels in the area and influence the contribution of all mines in the area with regards to the cumulative impact on the ambient noise levels.

After post closure phase of the proposed project, overall ambient levels will decrease to the pre-mining baseline and the cumulative impacts in the area could improve.

11 RECOMMENDATIONS

Noise levels from the proposed project must be monitored, especially at times of blasting, to determine potential sources of noise, increases and decreases in noise levels, and determine level of mitigation required. A grievance mechanism should be introduced whereby stakeholder issues need to be managed proactively and follow a structured approach where stakeholders can raise their concerns and receive the needed feedback in a timeous manner. In essence, an identified stakeholder issue, in terms of noise nuisance, will be reported through some communication (e.g., written report, verbal communication, e-mail, telephone call, meeting), as well as registered in a Stakeholder Issue Database for tracking purposes. The issue will then be assessed and an appropriate action plan will be designed to mitigate negative issues and capitalize on positive issues. The action plan will then be implemented. Lastly, there will be a follow-up with the relevant internal and external stakeholders to gauge the success of the action plan and identify any remaining issues. The responsibility of detailed setting out of procedures to be followed in recording, responding and tracking issues on a reactive basis will fall to the client or any entity they wish to assign this to.

Another recommendation is for Platreef to opt for the construction and operation of TSF site 2 because it has the least significant impact on the surrounding communities during the construction phase.

12 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 16. Table 16 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 12-1: Information pertaining to the recommended mitigation measures for the construction phase

Activity	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Responsible Person
Construction phase							
Infrastructure construction; and Mining development area.	To prevent the noise emanating from the construction machinery from impacting on the surrounding communities.	• Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; • Implement grievance mechanism; • Switching off equipment when not in use; and • Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures or barriers put up around the noise source such as berms. The barriers should be installed between the noise source and sensitive noise receptor, as close to the noise source as possible. • Blasting 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, 1993); • Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden (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.	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.	Construction	Environmental Manager
Operational phase							
Mining and process activities	To prevent the noise emanating from the mining machinery from impacting on the surrounding communities.	• Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; • Implement grievance mechanism; • Switching off equipment when not in use; and • Fixed noise producing sources such as generators, pump stations and crushers to be to be either housed in enclosures such as sheet cladding on the crushers and brick/concrete housing for pump stations. • A basic rule of thumb for barrier/berm height is: Any noise barrier should be at least as tall as the line-of-sight between the noise source and the receptor, 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).	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.	Operational phase	Environmental Manager
Decommissioning phase							
Rehabilitation activities.	To prevent the noise emanating from the machinery from	• Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers;	Vehicles to be service according to	National Environmental Management Air Quality Act (Act 39 of	Noise monitoring programme to be	Decommissioning phase	Environmental

	impacting on the sensitive receivers	• Implement grievance mechanism; • Switching off equipment when not in use; • Limiting transport activities to daylight hours; and • Limiting decommissioning activities to daylight hours where possible.	service plan. Machinery to be switched off when not in use.	2004) Environmental Conservation Act (Act 73 of 1989)	followed. Regular vehicle inspections.		Manager

13 MONITORING PLAN

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 in Table 13-1below:

Table 13-1: Monitoring plan

Method	Monitoring locations	Frequency	Target	Reporting
Sampled in accordance with the SANS 10103:2008; Noise measurement should be taken for a period not less than 10 min at each location	The noise measurements should be taken at the measurement locations Plat1 – Plat6) as per the baseline study	To be conducted according to the blasting schedule and as far possible kept to a quarterly basis; 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 bi-annual basis thereafter throughout the life of mine	Noise levels from the proposed mining activities should not measure above the measured baseline level at each mentioned community.	A report must be compiled quarterly/ bi-annual, depending on the intervals of the monitoring programme then submitted to management to ascertain compliance with the required standards

14 STUDY SUMMARY

In terms of the baseline conditions, it is gathered that the existing ambient noise levels in the immediate area are characteristic of suburban surroundings with noise levels ranging from 45 dBA to 51 dBA.

The findings have indicated by means of dispersion modelling that the noise produced by the proposed project will not measure above the SANS guidelines for suburban districts at the relevant surrounding communities during the construction operational and decommissioning phases, except for the intermittent blasting activities. More importantly is that the expected noise levels from the proposed continuous mining activities will not measure above the existing surrounding baseline noise levels.

The blasting noise levels are however expected to measure above the baseline line levels at the surrounding communities of Kgubudi, Magongwa, Tshamahansi and Mzumbani.

15 CONCLUSION

It is concluded that the blasting activities during construction will impact on Kgubudi, Magongwa and Mzumbani when blasting occurs at Shaft 1, shaft 3 and shaft 4 respectively. The blasting noise impact at Mzumbani may be less significant depending on whether the berm will be in place when blasting takes place at shaft 4.

The continuous noise activities during construction as well as operational phase will not impact on the surrounding communities because of the already high baseline levels as well as the major noise sources from the mining activities is expected to be limited to site. The impact therefore has a low significance rating. With effective mitigation measures in place the impact can further be reduced. It is recommended that Platreef opt for the construction and operation of TSF site 2 because it has the least significant impact on the surrounding communities during the construction phase.

16 REFERENCES

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Appendix A: Curriculum Vitae and Declaration of Independence

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
2010: Short course in Air Quality Management

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 Environmental

PAST 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 GIS and Air Quality 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. 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 and Sierra Leone.

My core focus is working on Environmental Noise impact assessments as well as Air Quality impact assessments, which includes the assessment, remediation and management of impacts related to noise and air quality.

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

- Assist with the compilation of EIA's and EMP's;
- Dust fallout monitoring (installation and maintenance for baseline as well as continuous compliance monitoring) ; and
- Noise monitoring (baseline as well as continuous compliance monitoring).

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 Platreef 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; and
- 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.

Lukas Sadler

Name of the Specialist

Signature of the Specialist

Digby Wells and Associates (PTY)Ltd

Name of company

01/10/2013

Date