DIGBY WELLS
ENVIRONMENTAL

Environmental Noise Impact Assessment for the Mining Operations at De Grooteboom Farm

Environmental Noise Impact Assessment Report

Project Number:

UAR2967

Prepared for:

De Groote Boom Minerals (Pty) Ltd

April 2015

Digby Wells and Associates (South Africa) (Pty) Ltd
(Subsidiary of Digby Wells & Associates (Pty) Ltd). Co. Reg. No. 2010/008577/07. Fern Isle, Section 10, 359 Pretoria Ave Randburg Private Bag X10046, Randburg, 2125, South Africa
Tel: +27 11 789 9495, Fax: +27 11 789 9498, info@digbywells.com, www.digbywells.com

This document has been prepared by Digby Wells Environmental.

Report Type:	**Environmental Noise Impact Assessment Report**
Project Name:	**Environmental Noise Impact Assessment for the Mining Operations at De Grooteboom Farm**
Project Code:	**UAR2967**

Name	Responsibility	Signature	Date
Lukas Sadler	Report Compiler		April 2015
Renée van Aardt	Report Reviewer		April 2015

EXECUTIVE SUMMARY

Digby Wells Environmental (hereafter Digby Wells) has been requested by De Groote Boom Minerals (Pty) Ltd (hereafter De Groote Boom), to compile and submit an Environmental Management Plan (EMP), pursuant to an application for a mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to the Limpopo Department of Mineral Resources (DMR).

This report relates specifically to the noise impacts of the proposed mining activities on the ambient noise climate of the area, which is rural to the north east, east and south east and mining industrial to the north, south and west, with numerous operational platinum and chrome mines. The approach used in investigating the noise impacts is based on the National Noise Control Regulations, R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989).

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

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

In terms of the baseline conditions, it is gathered that the existing ambient noise levels in the immediate area are typical of rural districts, with the average daytime levels measuring at 47dBA, which is similar to the SANS rural daytime guidelines. The average baseline night time levels are 45dBA which is above the SANS rural night time guidelines.

From the study, it is concluded by means of dispersion modelling that the noise produced by the proposed project at the location of identified receptors will not measure above the existing baseline noise levels. The overall significance rating of the noise impact is negligible.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1 Introduction

Digby Wells Environmental (hereafter Digby Wells) has been requested by De Groote Boom Minerals (Pty) Ltd (hereafter De Groote Boom), to compile and submit an Environmental Management Plan (EMP), pursuant to an application for a mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to the Limpopo Department of Mineral Resources (DMR).

The Mining Permit Application has been accepted by the Regional Manager, Limpopo Region, of the DMR under Reference LP 10656 MP and De Groote Boom has been instructed to prepare an EMP, which will include various specialist investigations, and a Public Participation Process (PPP) will be undertaken.

2 Terms of Reference

This report relates specifically to the noise impacts of the proposed mining activities on the ambient noise climate of the area, which is rural to the north east, east and south east and mining industrial to the north, south and west, with numerous operational platinum and chrome mines. The approach used in investigating the noise impacts is based on the National Noise Control Regulations, R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989). The following additional legislation and standards were also considered during the assessment:

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

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

3 Study Area

The Project is situated on the farm De Grooteboom 373 KT, near the town Steelpoort situated in the Limpopo Province (refer to Plan 1).

4 Expertise of the Specialist

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

5 Aims and Objectives

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

6 Methodology

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

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

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

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]
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
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 level at the nearest noise sensitive receptor to the proposed project. The noise measurement was taken at the location of the nearest noise sensitive receptor and subsequently the most likely to be impacted on by the proposed mining activities.

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

Table 6-3: Noise measurement location

Site ID	Location	Category of receiver	GPS coordinates
N1	Portion 2 of De Grooteboom 373 KT	Rural residential	24°55'49.87"S & 30° 8'36.65"E

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

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

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

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

Noise source	Sound power levels dBA	Quantity
Crawler Rig – P55	115	1
Drill Rig L6 (Norite)	117	2
ADT A40D – Water Bowzer	112	1
ADT B50	117	6
Hitachi 330 – Pecker/Support	112	1
Excavator Hitachi 670	110	4
Dozer D65	109	1
Grader 670 D	111	1
Loader Hitachi 310	110	1
Service Truck	95	1

Crusher Plant	105	1
Screening Plant	105	1
LDV's	85	11
Bus	95	1
Diesel Bowzer	106	1

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

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

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

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

7 Assessment Results

7.1 Baseline Results

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

Table 7-1: Results of the baseline noise measurements

Sample ID	SANS 10103:2008 rating limit					
	Type of district	**Period**	**Acceptable rating level dBA**	**$L_{Areq,T}$ dBA**	**Maximum/Minimum dBA**	**Date**
N1	Rural	Daytime	45	47	84 / 26	01/04/2015
		Night time	35	45	74 / 33	01/04/2015
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

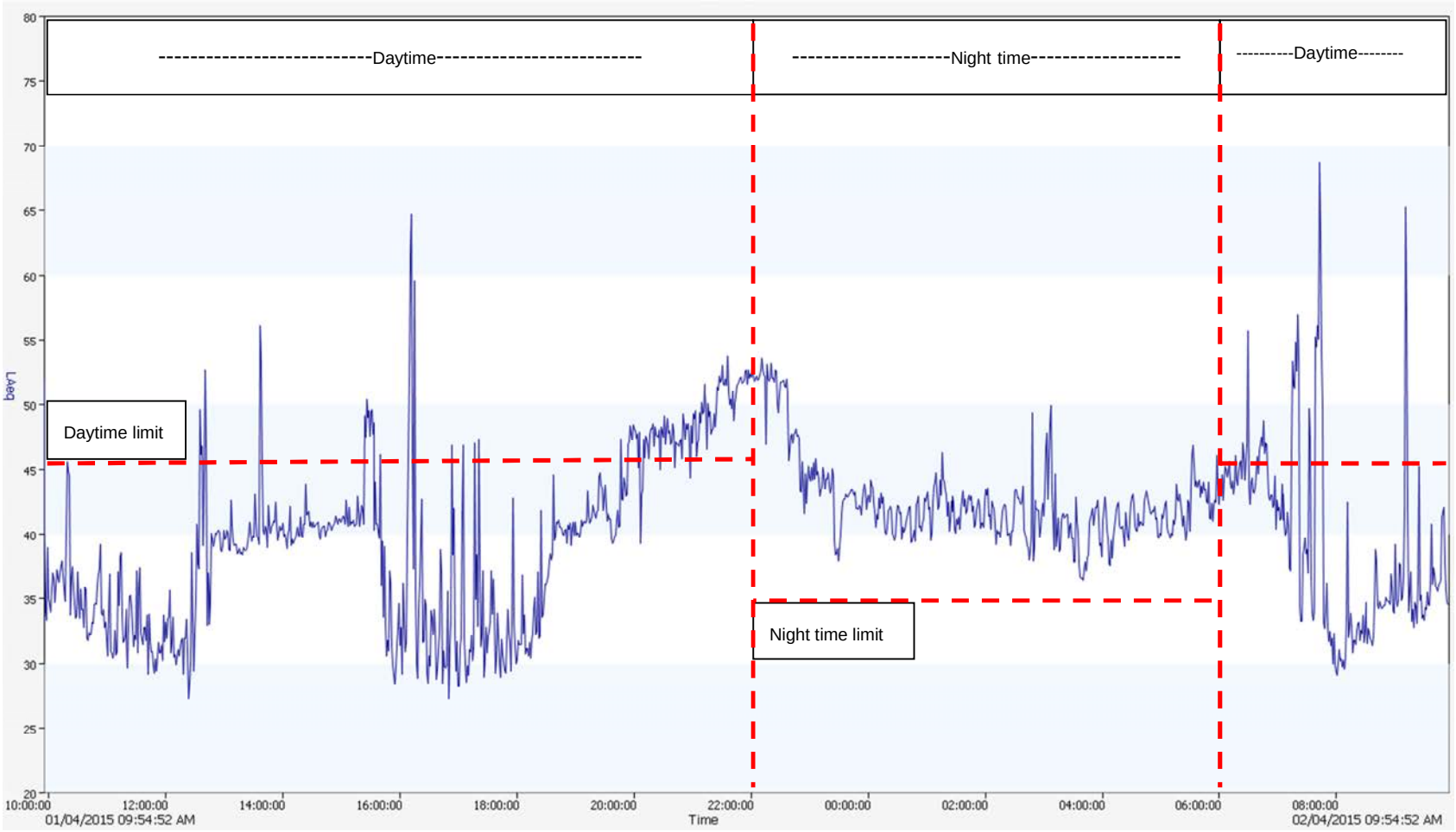


Figure 7-1: Noise time history graph for receptor N1

7.1.1 Daytime Results

Based on the daytime results, the existing ambient noise levels (47dBA) are slightly above the SANS rating levels for the maximum allowable outdoor daytime limit (45dBA) for ambient noise in rural districts. The main contributing noise sources were mainly dogs barking and occasional birdsong and vehicle movement.

7.1.2 Night Time Results

Based on the night time results, the existing ambient noise levels (45 dBA) are above the SANS rating levels for the maximum allowable outdoor night time limit (35 dBA) for ambient noise in rural districts. The main contributing noise sources causing the higher levels are insect noise during the night time.

7.2 Noise Dispersion Modelling Results

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

The construction and operational noise models indicate that the noise from the proposed mining operations will not measure above the existing daytime or night time baseline at the nearest rural receptors.

8 Impact Assessment and Evaluation

8.1 Environmental Impact Assessment Methodology

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

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

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

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

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

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

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

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

Significance = Consequence x Probability

Where

Consequence = Type of Impact x (Intensity + Spatial Scale + Duration)

And

Probability = Likelihood of an Impact Occurring

In addition, the formula for calculating consequence:

***Type of Impact** = **+1** (Positive Impact) or **-1** (Negative Impact)*

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

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

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

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

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	***Positive Impacts (Type of Impact = +1)***			
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.	Low positive impacts experience by very few of population.	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. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level social and environmental benefits felt by very few of the population.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month.	Highly unlikely/None Expected never to happen.

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

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

Table 8-3: Significance Threshold Limits

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

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

8.3 Potential Environmental Noise Impacts for Each Phase of the Project

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

8.3.1 Construction Phase

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

- Augmenting existing roads;
- Construction of pollution control dam (PCD);
- Transport of construction material, mobile plant and equipment to the site; and movement of haul trucks and excavator on haul roads;
- Site clearing and topsoil removal for mining area; and construction of box cut; and
- Preparing an area of approximately 2-3 ha for crushing, screening, stock piling, workshops, ablution and offices etc.

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

Criteria	Details / Discussion				
Description of impact	■ Mining machinery and vehicles may increase ambient noise levels at surrounding urban and rural noise sensitive receptors				
Mitigation required	■ Restricting construction activities to daylight hours where viable; ■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	-2	3	-18

Criteria	Details / Discussion				
Post-Mitigation	1	2	-1	2	-8

8.3.2 Operational Phase

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

- Topsoil removal and stockpiling; and extraction and transportation of bulk sample;
- Vehicular activity on haul roads; and operation of mining equipment;
- Crushing and screening of ore in the mobile plant; and
- Stockpiling material.

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

Criteria	Details / Discussion				
Description of impact	■ Mining machinery and vehicles may increase ambient noise levels at surrounding noise sensitive receptors				
Mitigation required	■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	5	-2	3	-27
Post-Mitigation	1	5	-1	2	-14

8.3.3 Decommissioning Phase

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

- Demolition / removal of portable and related infrastructure (if applicable);
- Vehicular activity: removal of mobile plant / equipment and vehicles; and
- Rehabilitation of site (As per surface use agreement roads, buildings etc. need not be rehabilitated).

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

Criteria	Details / Discussion				
Description of impact	■ Mining machinery and vehicles may increase ambient noise levels at surrounding urban and rural noise sensitive receptors.				
Mitigation required	■ Restricting construction activities to daylight hours where viable; ■ Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	-2	3	-18
Post-Mitigation	1	2	-1	2	-8

9 Cumulative Impacts

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

The existing noise sources in the immediate area of the proposed project are typical noise sources such as from the vehicle activity on the surrounding provincial roads. Existing mining operations from the surrounding mine are also impacting on the current soundscape of the area.

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

10 Mitigation Measures and Management Plan

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

Table 10-1: Mitigation measures and management plan

Activity	Objectives	Mitigation/Management measure	Frequency of mitigation	Legal Requirements	Recommended Action Plans	Timing of implementation	Responsible Person
Construction phase							
Augmenting existing roads; Construction of pollution control dam (PCD); Transport of construction material, mobile plant and equipment to the site; and movement of haul trucks and excavator on haul roads; Site clearing and topsoil removal for mining area; and construction of box cut; and Preparing an area of approximately 2-3 ha for crushing, screening, stock piling, workshops, ablution and offices etc.	To prevent the noise emanating from the construction machinery 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. installed exhaust mufflers; and ▪ Switching off equipment when not in use.	Vehicles to be service according to service plan. Machinery to be switched off when not in use.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Regular vehicle inspections.	Construction	Environmental Manager
Operational phase							
Topsoil removal and stockpiling; and extraction and transportation of bulk sample; Vehicular activity on haul roads; and operation of mining equipment; Crushing and screening of ore in the mobile plant; and Stockpiling material.	To prevent the noise emanating from the blasting and mining machinery 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. installed exhaust mufflers; and ▪ Switching off equipment when not in use.	Vehicles to be service according to service plan; Machinery to be switched off when not in use; and Blasting mitigation measures to be implemented for every occurrence.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989)	Regular vehicle inspections.	Operational phase	Environmental Manager
Decommissioning phase							
Demolition / removal of portable and related infrastructure (if applicable); Vehicular activity: removal of mobile plant / equipment and vehicles; and Rehabilitation of site (As per surface use agreement roads, buildings etc. need not be rehabilitated).	To prevent the noise emanating from the machinery 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. installed exhaust mufflers; and ▪ Switching off equipment when not in use.	Vehicles to be service according to service plan. Machinery to be switched off when not in use.	National Environmental Management Air Quality Act (Act 39 of 2004) Environmental Conservation Act (Act 73 of 1989	Regular vehicle inspections.	Decommissioning phase	Environmental Manager

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

11 Conclusion

Based on the national noise control regulations, whereby disturbing noise means a noise level that causes the ambient noise level to rise above the designated zone or district level, or if no zone level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more, it is concluded that the proposed mining operations will not impact on the nearest noise sensitive receptors.

The main reason for the low impact is because the expected noise levels from the mining activities will measure at around 5dBA lower than the existing baseline noise levels at the surrounding rural receptors.

12 References

National Conservation Act, Act 73 of 1989;

National Environmental Management Act, Act no 107 of 1998;

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

National Noise Control Regulations;

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

Appendix A: Curriculum Vitae and Declaration of Independence

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

Education

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

Employment

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

Experience

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

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

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

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

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

Project experience

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

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

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

Declaration of Independence

I, Lukas Sadler, declare that I –

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

Lukas Sadler

Name of the Specialist

Signature of the Specialist

Digby Wells and Associates (Pty) Ltd

Name of company

22/04/2015

Date

Appendix B: List of Plans

Plan 1

De Groote Boom Mining Permit

Noise Monitoring Location

Legend

- Noise Monitoring Location
- Prospecting Area
- Main / Secondary Road
- Minor Road
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam
- Wetland
- Farm Boundary
- Provincial Boundary

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.145
Datum: WGS84	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2014

N

0 0.5 1 2

Kilometres

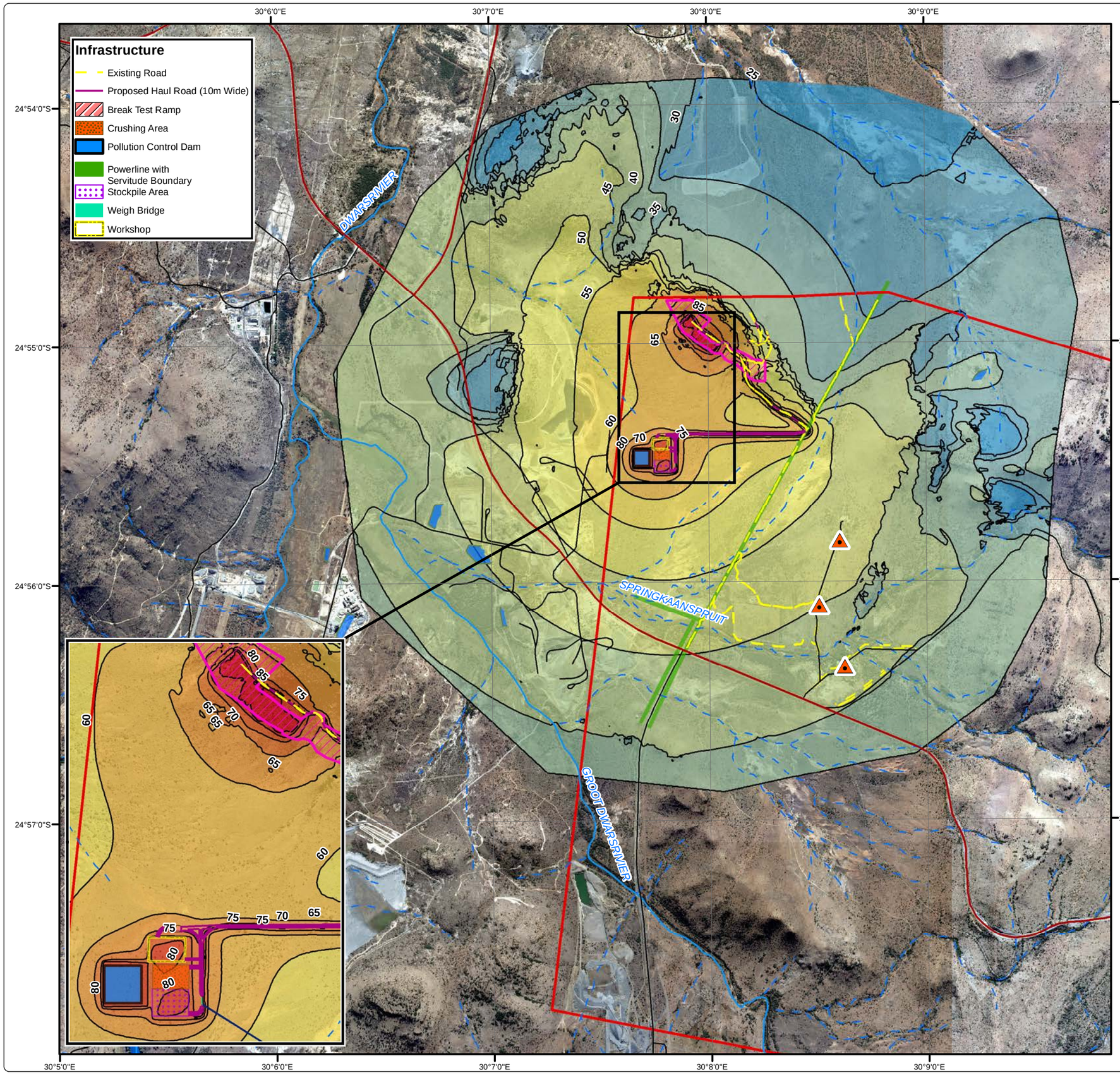
1:50 000

www.digbywells.com

Plan 2

De Groote Boom Mining Permit

Construction Phase Noise Dispersion



Legend

- Prospecting Area
- Study Area
- Noise Sensitive Receptors
- Main / Secondary Road
- Minor Road
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam

Noise Dispersion

dBA

- 9.91
- 25
- 30
- 35 (night time limit guideline)
- 40
- 45 (daytime limit guideline)
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- 85

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS84
Central Meridian: 31°E

Ref #:sdp.UAR2967.201504.149
Revision Number: 1
Date: 23/04/2015

N

0 0.25 0.5 1 1.5

Kilometres

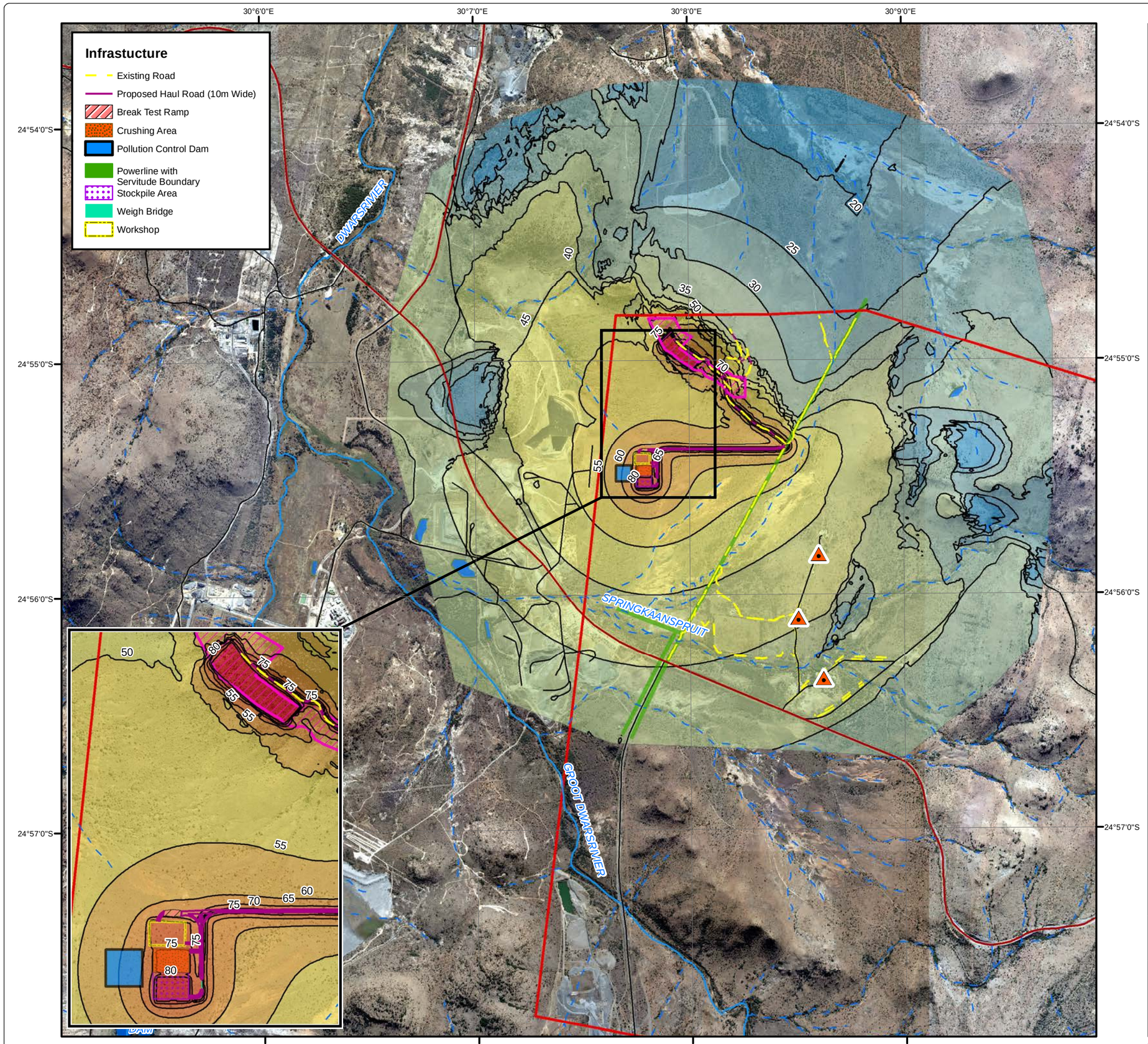
1:30 000

www.digbywells.com

Plan 3

De Groote Boom Mining Permit

Operational Phase Noise Dispersion



Legend

- Prospecting Area
- Study Area
- Noise Sensitive Receptors
- Main / Secondary Road
- Minor Road
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam

Noise Dispersion

dBA

- 4.76
- 20
- 25
- 30
- 35 (night time limit guideline)
- 40
- 45 (daytime limit guideline)
- 50
- 55
- 60
- 65
- 70
- 75
- 80

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #:sdp.UAR2967.201504.149
Datum: WGS84	Revision Number: 1
Central Meridian: 31°E	Date: 23/04/2015

N

0 0.25 0.5 1 1.5

Kilometres

1:30 000