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Section 102 Amendment Of Lanxess Chrome Mine's Environmental Management Plan To Include The New Proposed Opencast Area

Environmental Noise Impact Assessment Report

Project Number:

LAN3111

Prepared for:

Lanxess Chrome Mining (PTY) Ltd

January 2015

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This document has been prepared by Digby Wells Environmental.

Report Type:	**Environmental Noise Impact Assessment Report**
Project Name:	**Section 102 Amendment Of Lanxess Chrome Mine's Environmental Management Plan To Include The New Proposed Opencast Area**
Project Code:	**LAN3111**

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

EXECUTIVE SUMMARY

Digby Wells Environmental has been appointed by Lanxess Chrome Mining (Pty) Ltd for the Amendment of the existing Environmental Management Programme (EMP) Report for its Lanxess Chrome Mine (LCM), to include the expansion of the underground operations to neighbouring areas (Segment 1, 2, 3 & 4), a ventilation shaft to support the underground mining activities as well as the establishment of an open pit operation within LCM.

The EMP Report will be updated to include an Environmental Impact Assessment (EIA) process and associated Public Participation Process (PPP) undertaken in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). This report will assess whether the noise from the proposed open pit mining activities will impact on the surrounding soundscape and will be complied in support for the authorisation of the proposed open pit mining operation on the farm Rietfontein. This report relates specifically to the noise impacts of the proposed open pit on the ambient noise climate of the area, which is rural and suburban to the south, with numerous operational chrome and platinum mines in the surrounding area as well. The approach used in investigating the noise impacts is based on the National Noise Control Regulations, R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989). The following additional legislation and standards were also considered during the assessment:

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

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

From the study it is concluded by means of dispersion modelling that the noise produced by the proposed project will not measure above the existing baseline noise levels as well as not measure above the SANS day and night time guideline rating limit at the surrounding industrial,suburban or rural areas. The overall significance rating of the noise impact is low.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF PLANS

1 Introduction

Digby Wells Environmental (hereafter referred to as Digby Wells) has been appointed by Lanxess Chrome Mining (Pty) Ltd (herein referred to as Lanxess) for the amendment of the existing Environmental Management Programme (EMP) Report for its Lanxess Chrome Mine (LCM), to include the expansion of the underground operations to neighbouring areas (Segment 1, 2, 3 & 4), a ventilation shaft to support the underground mining activities as well as the establishment of an open pit operation within LCM.

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2 Terms of Reference

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

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3 Study Area

Lanxess Chrome Mine is located 7 km east of Kroondal and 11 km south-east of Rustenburg and falls within the Rustenburg Local Municipality of the North West Province. The current mining rights of Lanxess cover various portions of the farms Kroondal 304 JQ, Rietfontein 338 JQ and Klipfontein 300 JQ. The extent of this area is 952.5 ha. The mine is part of a mineral deposit known as the Bushveld Igneous Complex which holds the majority of South Africa's chrome ore deposits.

The process will involve the authorisation of the proposed open pit mining operation on the farm Rietfontein 338 JQ (owned by the mine) and the proposed underground mining operations on portions of the farms Kroondal 304 JQ, Klipfontein 300 JQ and Brakspruit 299 JQ. Glencore Operations South Africa (Pty)(Ltd) (formally known as Xstrata) currently holds the mining rights for some of these areas which are currently in the legal process of being transferred to Lanxess.

4 Expertise of the Specialist

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

5 Aims and Objectives

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

6 Methodology

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

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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						

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]
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 criteria that were used for the siting of the measurement locations were as follows:

- The location of the nearest rural receptors to the proposed project and subsequently the most likely to be impacted by the proposed mining activities; and
- Locations that served as a suitable reference point for the measurement of ambient sound levels surrounding the proposed project area. The noise measurement locations cover a rural receptor (N1 and N2).

A Cirrus, Optimus Green, precision integrating sound level meter was used for the measurements. The instrument was field calibrated with a Cirrus, sound level calibrator. The baseline location is presented in Table 6-3 as well as on Plan 1 below. Photographs of the measurement locations are presented in Figure 6-1 to Figure 6-2.

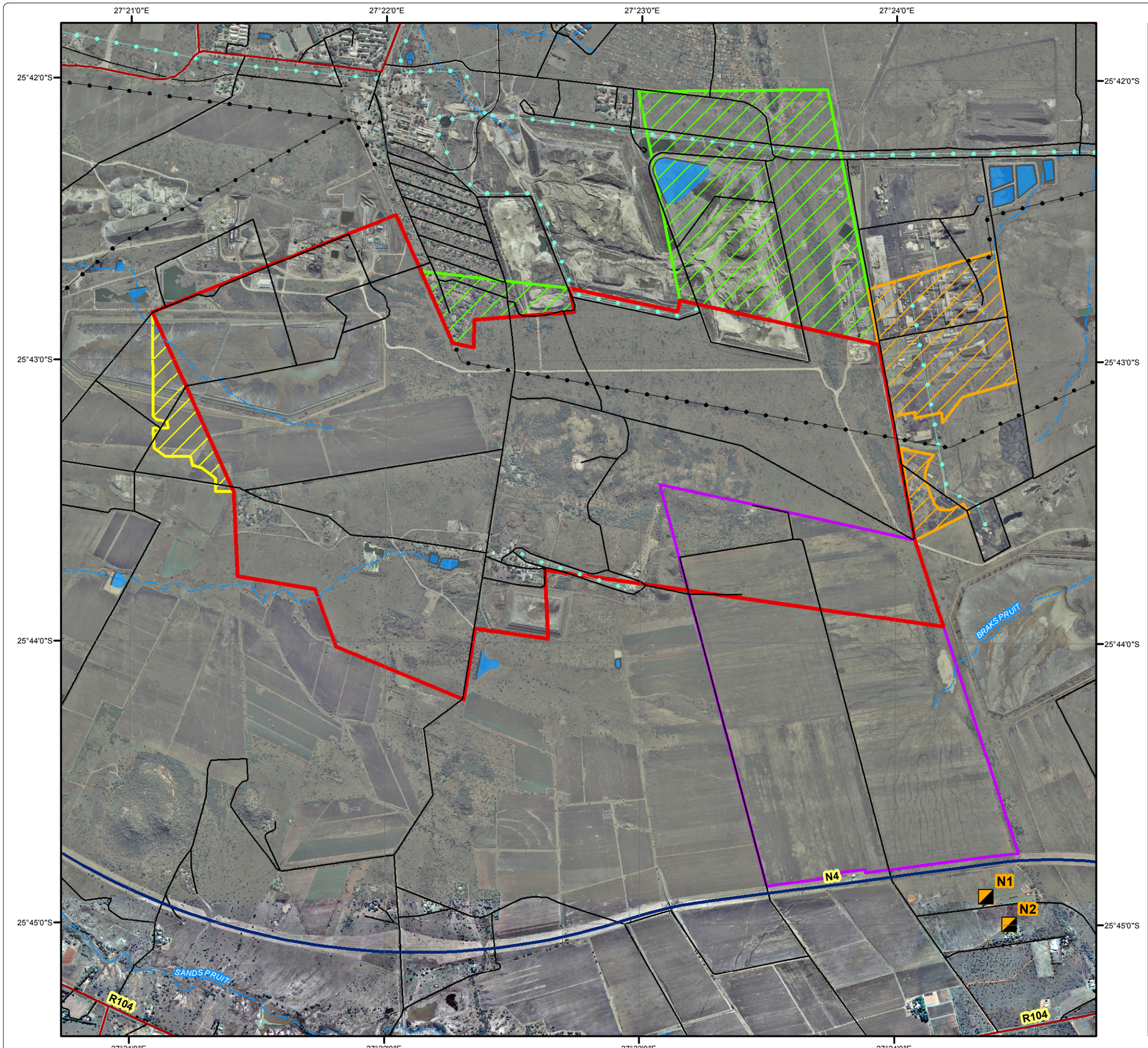
Table 6-3: Noise measurement location

Site ID	Location	Category of receiver	GPS coordinates
N1	Portion 15 of Waagfontein 340 JQ	Rural residential	25°44'53.97"S & 27°24'21.38"E
N2	Portion 16 of Waagfontein 340 JQ	Rural residential	25°44'59.81"S & 27°24'26.84"E

Plan 1

Lanxess Chrome Mine S102 EMP Amendment

Noise Monitoring Points



Legend

- Noise Monitoring Points
- Lanxess Mining Right Area
- Opencast Project Area

Underground Project Area

- Amplats Option Area
- Kroondal Area
- Wonderkop Area
- Power Line
- Arterial / National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Pipeline
- Non-Perennial Stream
- Dam Wall
- Dam / Lake

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Revision Number: 1
Date: 24/02/2015

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Kilometres
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Figure 6-1: Measurement location N1

Figure 6-2: Measurement location N2

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

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

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

Noise source	**Sound power levels dB**						
Octave band frequencies	*63Hz*	*125Hz*	*250Hz*	*500Hz*	*1000Hz*	*2000Hz*	*4000Hz*
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
Dozer	110	122	113	114	110	108	104
Operational phase							
Haul Truck	108	118	115	114	110	106	102
Shovel	105	117	113	114	111	107	101

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

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

When comparing the measured ambient sound pressure level with the modelled noise levels and you want to know the combined sound pressure level to assess the cumulative noise level, the sound levels must be added together. However, due to the fact that the dBA's 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 dBA's. 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 dBA 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 and Figure 7-2.

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	58	89 / 42	14/01/2015
		Night time	35	54	72 / 33	14/01/2015
N2	Rural	Daytime	45	54	85 / 35	15/01/2015
		Night time	35	54	77 / 41	15/01/2015
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit					

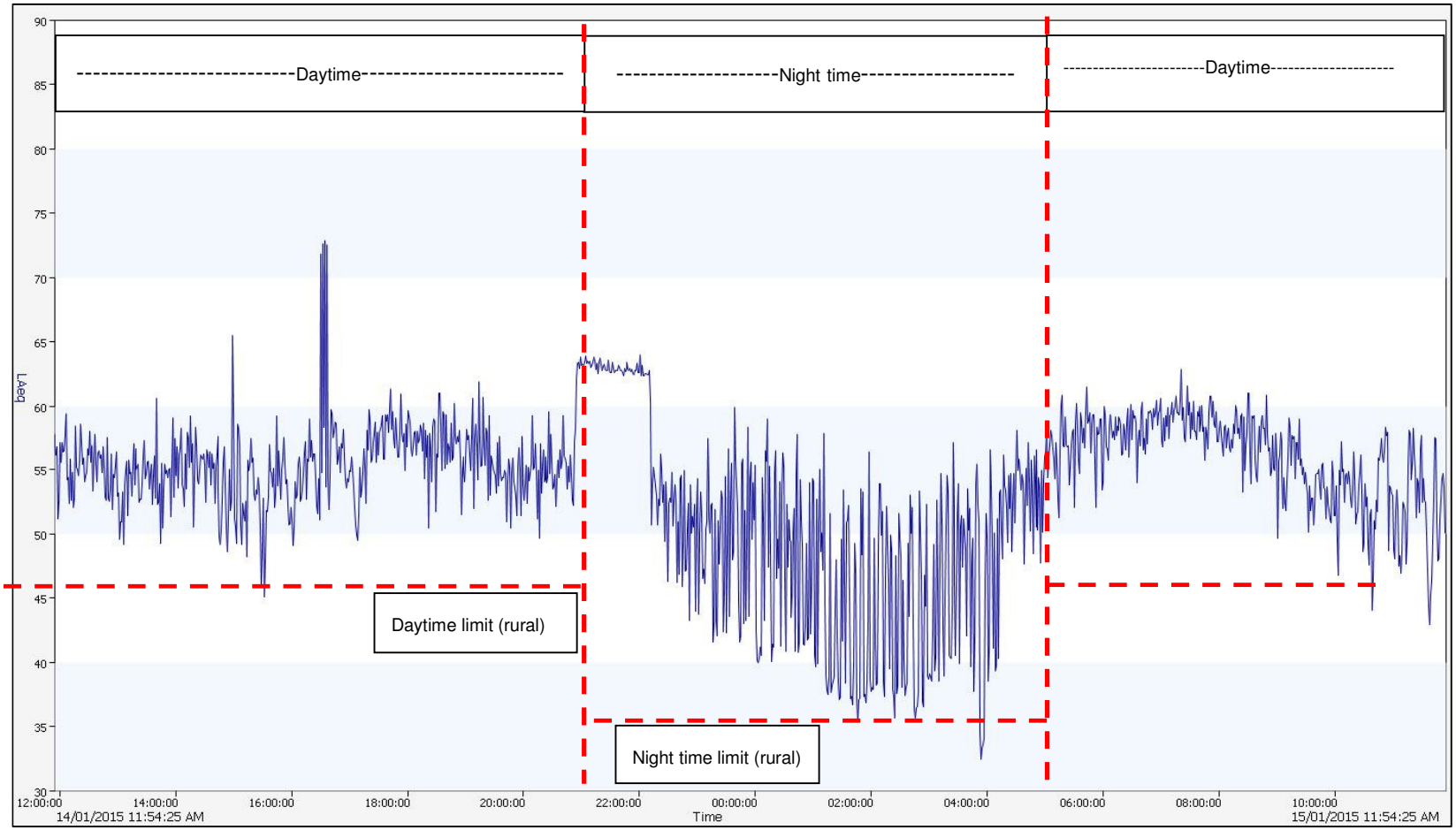


Figure 7-1: Noise time history graph for N1

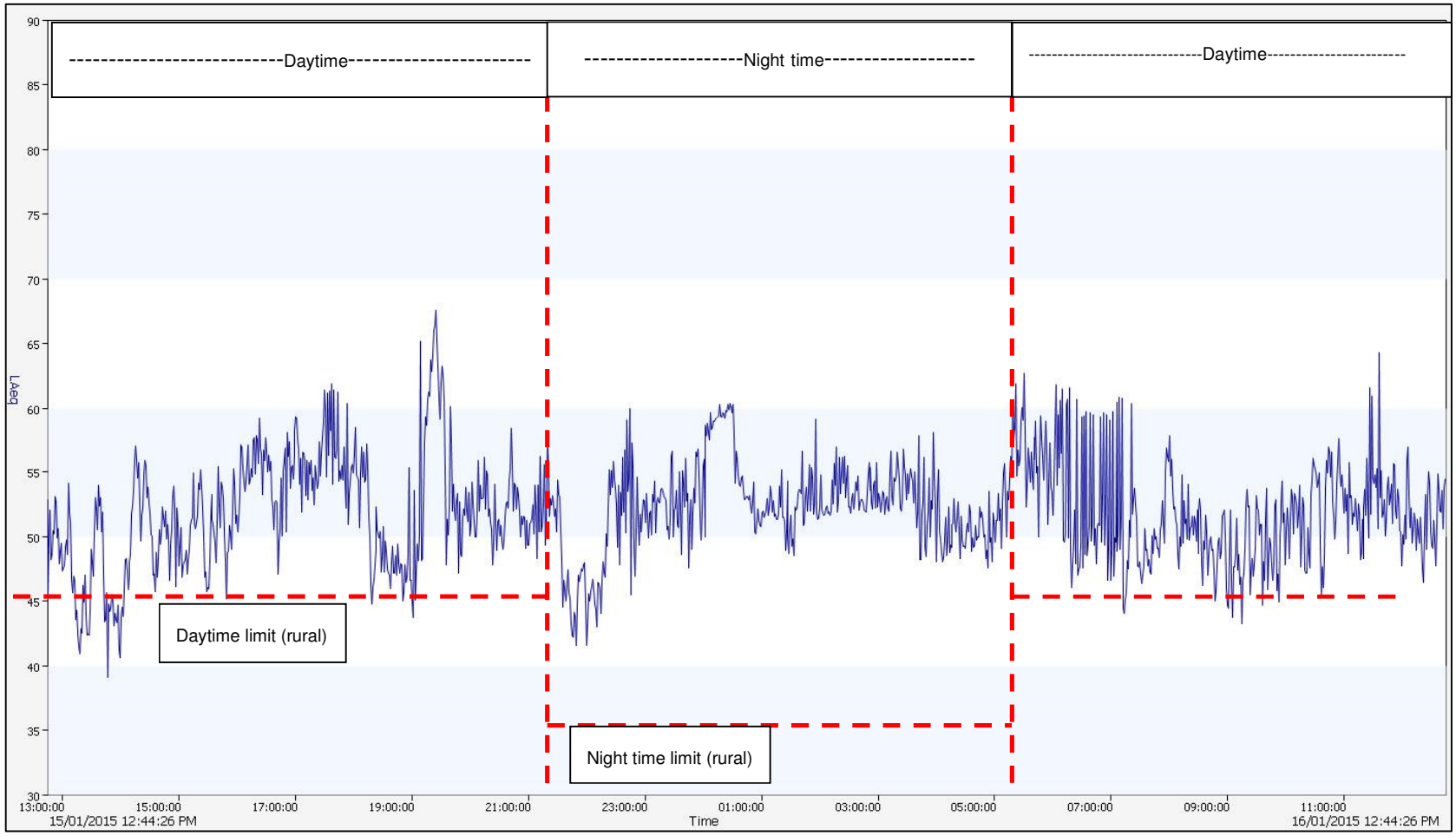


Figure 7-2: Daytime noise time history graph for N2

7.1.1 Daytime Results

Based on the daytime results at N1, the existing ambient noise levels are above the SANS rating levels for the maximum allowable outdoor daytime limit (45 dBA) for ambient noise in rural districts. The average daytime noise level measured 58 dBA. The noise sources contributing to the ambient daytime levels at N1 are due mainly the frequent vehicular activity on the N4 running 200 meters to the north of the property.

Based on the daytime results at N2, the existing ambient noise levels are slightly above the SANS rating levels for the maximum allowable outdoor daytime limit (45 dBA) for ambient noise in rural districts. The average daytime noise level measured 54 dBA. The noise sources contributing to the ambient daytime levels at N2 are mainly frequent vehicle activity on the N4 (400 meters to the north) as well as the infrequent vehicle activity on the R104 (600 meters to the south).

7.1.2 Night Time Results

Based on the night time results at N1and N2, the existing ambient noise levels are above the SANS rating levels for the maximum allowable outdoor night time limit (35 dBA) for ambient noise in rural districts. The average night time noise level measured 54dBA. The noise sources contributing to the ambient night time levels are mainly the vehicle activity on the N4 as well as insect noise from the *gryllidae* (crickets).

7.2 Noise Dispersion Modelling Results

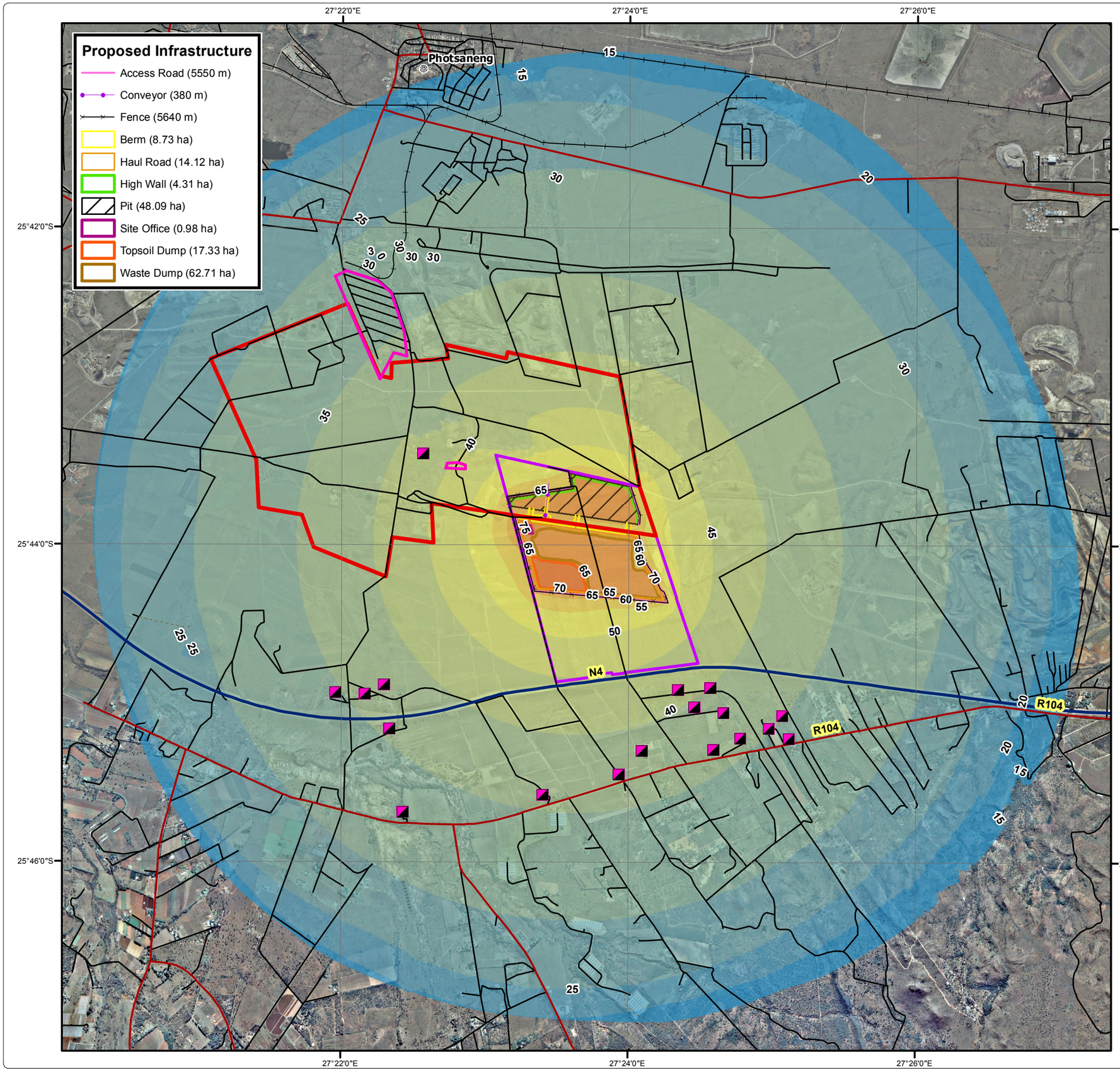
This section presents the results of the predictive modelling, which subsequently indicates the noise attenuation from the proposed mining activities in relation to the surrounding noise sensitive receptors. The graphic plots, shown on Plan 2 and Plan 3, present the noise contour lines and visually indicate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

The construction and operational noise models indicate that the noise from the proposed opencast operation will not measure above neither the industrial, suburban nor rural daytime and night time guidelines as well as will not measure above the existing daytime or night time baseline at the surrounding suburban and rural receptors.

Plan 2

Lanxess Chrome Mine S102 EMP Amendment

Noise Dispersion Model Construction Phase



Legend

- Lanxess Mining Right Area
- Opencast Project Area
- Receptor Points
- Receptor Areas
- Other Town
- Arterial / National Route
- Main Road
- Minor Road
- Track
- Railway Line

Noise Dispersion Model

dBA

- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35 (Rural Night-time Limit)
- 35 - 40
- 40 - 45 (Rural Daytime Limit)
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- 80 - 85
- > 85

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Central Meridian: 27°E	Date: 05/06/2015

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Kilometres

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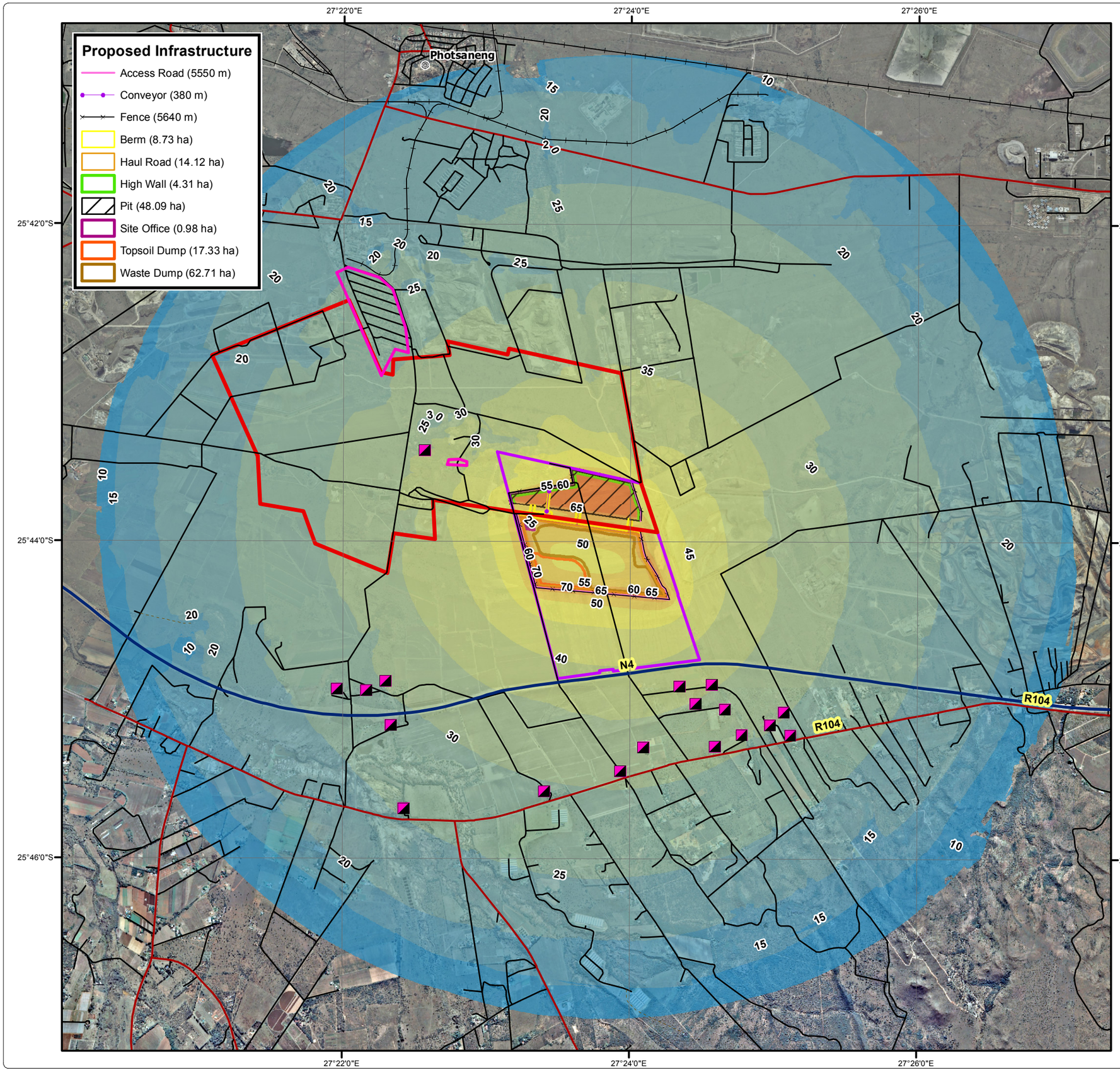
Plan 3

Lanxess Chrome Mine S102 EMP Amendment

Noise Dispersion Model Operational Phase



Legend

- Lanxess Mining Right Area
- Opencast Project Area
- Receptor Points
- Receptor Areas
- Other Town
- Arterial / National Route
- Main Road
- Minor Road
- Track
- Railway Line

Noise Dispersion Model dBA

- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35 (Rural Night-time Limit)
- 35 - 40
- 40 - 45 (Rural Daytime Limit)
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80
- > 80

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Date: 05/06/2015

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8 Impact Assessment and Evaluation

8.1 Environmental Impact Assessment Methodology

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

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

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

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

It has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and 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 significance rating process follows the established impact / risk formula:

Significance = Consequence x Probability

Where

Consequence = Severity + Spatial Scale + Duration

And

Probability = Likelihood of an impact occurring

The matrix calculates the rating out of 147, whereby Severity, Spatial Scale, Duration and Probability are each rated out of seven as indicated in Table 8-1. The weight assigned to the various parameters for positive and negative impacts is provided for in the formula.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this EIA/EMP Report. The significance of an impact is then determined and categorised into one of four categories, as indicated in Table 8-3, which is extracted from Table 8-2. The description of the significance ratings is discussed in Table 8-4.

Table 8-1: Impact assessment parameter ratings

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	***Social, cultural heritage***			
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.	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.

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	***Social, cultural heritage***			
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.	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely Has not happened yet but could 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 8-2: Probability 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 8-3: Significance threshold limits

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

Table 8-4: Significance rating description

Score	Description	Rating
≤35	An acceptable 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 either positive or negative medium to short term effects on the social and/or natural environment.	Low / Negligible
36 - 72	An important 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 either a positive or negative medium to long-term effect on the social and/or natural environment.	Medium-Low / Minor

Score	Description	Rating
73 - 108	A serious impact, if not mitigated, may prevent the implementation of the project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe effects or beneficial effects	Medium-High / Moderate
>108	A very serious impact which, if negative, 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, or very beneficial effects.	High / Major

8.3 Potential Environmental Noise Impacts for Each Phase of the Project

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

8.3.1 Construction Phase

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

- Site clearance and topsoil removal prior to the commencement of physical construction activities across the project area;
- The construction of waste rock dumps;
- The construction of topsoil stockpiles;
- The establishment of the initial boxcut and access ramps to the open-pit mining areas;
- The establishment of underground access shaft;
- The construction of haul roads on site;
- The construction of the access or service road; and
- The construction of the hard park area (this is made up of the workshop, office block and parking lot).

Table 8-5: Pre-mitigation and Post-mitigation significance ratings for impacts on noise during the construction phase.

Activity/Impact	**Site clearance and construction activities**				
Criteria	**Details / Discussion**				
Description of impact	Mining machinery and vehicles is expected to increase ambient noise levels on site, but according to the dispersion models the noise levels are expected to be restricted to site. The negligible impacts are due to the noise not impacting on the surrounding 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*	*Severity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	2	3	18
Post-Mitigation	1	2	1	2	8

8.3.2 Operational Phase

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

- Drilling and blasting of the overburden rock for easy removal by excavators and dump trucks;
- Dumping of waste rock and maintenance of waste rock dump;
- Removal and loading of ore onto trucks (O/C) or conveyor (U/G) to the plant;
- Vehicular activity on the proposed roads and maintenance activities; and
- Concurrent replacement of overburden and topsoil and the re-vegetation of mined out strips. The mined strip will be backfilled with the overburden and compacted. Subsequently, the topsoil will be placed on top of the overburden and the area will be vegetated.

Table 8-6: Pre-mitigation and Post-mitigation significance ratings for impacts on noise during the operational phase.

Activity/Impact	**Drilling, blasting and operational activities**				
Criteria	**Details / Discussion**				
Description of impact	Mining machinery and vehicles is expected to increase ambient noise levels on site, but according to the dispersion models the noise levels are expected to be restricted to site. The negligible impacts are due to the noise not impacting on the surrounding 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*	*Severity*	*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:

- Removal of surface infrastructure (pant machinery, shafts, conveyors);
- Rehabilitation of roads and cleared areas (offices and workshop area); and
- Final replacement of overburden and topsoil and the establishment of vegetation on the final open cast void. Overburden will be backfilled into the final void and compacted. Subsequently, topsoil will placed and the area vegetated.

Table 8-7: Pre-mitigation and post-Mitigation significance ratings for impacts on noise during the decommissioning phase.

Activity/Impact	**Demolition and removal of surface infrastructures and rehabilitation works**
Criteria	**Details / Discussion**
Description of impact	Mining machinery and vehicles is expected to increase ambient noise levels on site, but due to the limited activities the noise levels are expected to be restricted to site. The negligible impacts are due to the noise not impacting on the surrounding 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

Activity/Impact	Demolition and removal of surface infrastructures and rehabilitation works				
Criteria	**Details / Discussion**				
	noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ■ Switching off equipment when not in use.				
Parameters	*Spatial*	*Duration*	*Severity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	2	3	18
Post-Mitigation	1	2	1	2	8

8.3.4 Post-closure Phase

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

Table 8-8: Significance ratings for impacts on noise during the post closure phase.

Activity/Impact	All noise causing activities have ceased during this phase				
Criteria	**Details / Discussion**				
Description of Impact	The noise impact during this phase will be neutral due to the expected ambient noise level returning to pre-mining baseline.				
Mitigation Required	■ None required				
Parameters	*Spatial Scale*	*Duration*	*Intensity*	*Probability*	*Significance Rating*
Pre-Mitigation	1	7	1	7	63
Post-Mitigation	*This is a positive impact with a neutral net benefit.*				

9 Cumulative Impacts

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

The existing noise sources in the immediate area of the proposed project are typical noise sources to be found in industrial and suburban areas to the north and north east, as well as rural and suburban areas with main roads to the south. Frequent vehicle activity on the N4 and R104 roads being the main existing noise source as well as with other noise sources associated with light industrial activities.

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

10 Mitigation Measures and Management Plan

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

Table 10-1: Mitigation measures and management plan

Activity	Objectives	Mitigation/Management Measure	Frequency of Mitigation	Legal Requirements	Recommended Action Plans	Timing of Implementation	Responsible Person
Construction phase							
Site clearance and topsoil removal; Construction of associated infrastructure; and Establishment of initial boxcut.	To prevent the noise emanating from the construction machinery from impacting on the sensitive receptors	▪ 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. ▪ 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; Restriction of blasting to daylight hours are mitigation measures that should be followed (Sengupta, 1993); and ▪ Maintaining good public relations with the surrounding communities i.e. warning the local communities in advance before blasts.	Vehicles to be service according to service plan. Machinery to be switched off when not in use. 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.	Construction	Environmental Manager
Operational phase							
Drilling and blasting; Ore removal; Vehicle movement on haul roads; and Concurrent rehab.	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; and 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.	Operational phase	Environmental Manager
Decommissioning phase							
Demolition of infrastructure; and Final rehab	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 level, or if no zone level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more, it is concluded that the proposed mining activities will not impact on the surrounding areas.

The main reason for the low impact is because the expected noise levels from the open cast mining activities will measure between 9 dBA and 12 dBA lower than the existing baseline noise levels and will therefore not increase the existing ambient noise levels.

12 References

- National Conservation Act, Act 73 of 1989;
- National Environmental Management Act, Act no 107 of 1998;
- National Environmental Management Air Quality Act, Act no 39 of 2004;
- National Noise Control Regulations
- Sengupta, M. Environmental Impacts of Mining: Monitoring, Restoration, and Control. CRC Press, 1993
- South African National Standard - Code of practice, SANS 10103:2008, Edition Six, The measurement and rating of environmental noise with respect to annoyance and to speech communication. Available [online] http://www.sabs.co.za.

Appendix A: Curriculum Vitae and Declaration of Independence

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

Education

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

Employment

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

Experience

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

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

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

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

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

Project experience

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

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

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

Professional affiliations

The National Association for Clean Air (NACA)

Declaration of Independence

I, Lukas Sadler, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the proposed Lanxess Open Cast 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

13/03/2015

Date