

**ENVIRONMENTAL NOISE IMPACT
ASSESSMENT**

FOR THE CITY DEEP OPERATIONS

CROWN GOLD RECOVERIES (PTY) LTD

OCTOBER 2009



Environmental Solutions Provider

Prepared By:
Digby Wells & Associates
Environmental Solutions Provider
Private Bag X10046,
Randburg, 2125,
South Africa
Tel: +27 (11) 789-9495
Fax: +27 (11) 789-9498
E-Mail: info@digbywells.co.za

EXECUTIVE SUMMARY

Ambient noise measurements were conducted at relevant receptors surrounding the slimes dams as well as sand dumps that make up the City Deep Operations. The measurements were taken once during the day and once during the night time for a period of 15 minutes to determine if the reclamation activities are impacting on the ambient noise levels.

The results were compared to the rating levels established by the South African Bureau of Standards (SABS). The South African National Standard for “the measurement of environmental noise with respect to land use, health, annoyance and speech communication” (SANS 10103:2008) underwritten by SABS, which gives guidelines for acceptable rating levels for ambient noise in various districts for land use purposes

Based on the results from the daytime baseline environmental noise measurements that were carried out in residential districts, the ambient noise levels were below the maximum allowable outdoor limit for ambient daytime noise in residential districts. The rest of the measurements were carried out in industrial districts in the City Deep area and the ambient noise levels measured below the maximum allowable outdoor limit for ambient daytime noise in industrial districts. The main noise sources influencing the measurements in the residential districts during the daytime were the vehicular traffic on the roads and the domestic animals. The main noise sources influencing the measurements in the industrial districts during the daytime were from cargo trucks, ventilation fans as well as vehicular traffic on the main roads running through the industrial parks such as the M33 and M2.

The night time ambient noise levels at measurement which was carried out in residential districts ranged from below the maximum allowable outdoor limit for ambient night time noise in residential districts, to slightly above. The rest of the measurements carried out in industrial districts in the City Deep area ranged from below the maximum allowable outdoor limit for ambient night time noise in industrial districts, to slightly above. The main noise sources influencing the measurements in the residential districts during the night time were the vehicular traffic on the roads such as the M33. The main noise sources influencing the measurements in the industrial districts during the night time were from cargo trucks, ventilation fans as well as vehicular traffic on the main roads running through the industrial parks such as the M33 and M2.

It is concluded that the noise impacts from the reclamation activities is of a low significance because most of the slimes dams/sand dumps which are being reclaimed as part of the City Deep operations, are situated in industrial districts. The noise levels in these areas are high but this is expected, with the type of activities associated with industrial districts. Most relevant receptors such as warehouses and workshops have their own associated high noise producing sources.

TABLE OF CONTENTS

1	TERMS OF REFERENCE	1
2	INTRODUCTION	1
3	STUDY AREA	2
4	EXPERTISE OF THE SPECIALIST	2
5	METHODOLOGY	2
5.1	Results.....	8
6	DISCUSSION OF RESULTS:	19
7	ENVIRONMENTAL IMPACT ASSESSMENT	20
7.1	Impact assessment for the various phases.....	21
7.1.1.	Construction phase.....	21
7.1.2.	Operational phase.....	21
7.1.3.	Decommissioning phase	21
8	MITIGATION MEASURES	21
9	CUMULATIVE IMPACTS	22
10	KNOWLEDGE GAPS	22
11	ENVIRONMENTAL MONITORING PROGRAMME	23
12	CONCLUSION	24
13	REFERENCES	25

LIST OF TABLES

Table 1: Acceptable rating levels for noise in districts (SANS 10103, 2008).....	3
Table 2: Categories of community/group response (SANS 10103, 2008)	5
Table 3: Slimes dams/Sand dumps being reclaimed.....	6
Table 4: Relevant measurement locations at 3A17/3L45	7
Table 5: Relevant measurement locations at 3A9/3L25	7

Table 6: Relevant measurement locations at 3A19.....8

Table 7: Results of the baseline noise measurements9

Table 8: Noise levels at source of primary noise sources on site20

LIST OF APPENDICES

Appendix A: CV26

Appendix B: Location of noise sampling points.....27

1 TERMS OF REFERENCE

Digby Wells and Associated (DWA) was commissioned by Crown Gold Recoveries (Pty) Ltd to conduct an environmental noise impact assessment for the reclamation activities of the City Deep operations in the city of Johannesburg, Gauteng Province. The purpose of the study was to assess the impact of the reclamation activities of the tailings dams and sand dumps on the ambient noise climate of the area, which are primarily industrial and residential zones. The approach used in investigating noise impacts is based on guidelines provided by the South African National Standards (SANS). The following legislation was considered for this survey:

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

The Environmental Noise Impact Assessment report will include baseline noise measurements taken at relevant receptors, the significance of the noise impacts on the relevant receptors as well as recommendations, monitoring plan and mitigation measures.

2 INTRODUCTION

The City Deep operation is responsible for the reclamation of sand and slimes dams that were deposited as tailings during past gold mining operations in the Witwatersrand area. The slimes are either mechanically or hydraulically reclaimed and transported to the City Deep plant via pipelines. The material is then processed to produce gold which is then sold to Rand Refineries.

Mining is a contributor to environmental noise pollution, with noise sources such as machinery used during reclamation. These noise sources impact on the local ambient noise levels. There are two major categories of noise sources associated with reclamation of tailings dams and sand dumps. They are:

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

Baseline noise measurements in support of an environmental noise impact assessment were performed for the City Deep operations. The baseline noise measurements were done to determine the significance of the impact on the ambient noise levels at the relevant receptors.

Currently SANS have no documented standards describing acceptable noise levels for mining. The SANS10103:2008 “The measurement and rating of environmental noise with respect to health, land use, annoyance and to speech communication” (SANS10103:2008), has thus been used to assess the noise impacts of the mining

operation. The SANS10103:2008 covers methods and provides guidelines to assess working and living environments with respect to acoustic comfort, excellence, preservation of health, land use and with respect to possible annoyance by noise. In addition the SANS 10103:2008 guidelines give the acceptable levels of noise in both residential and non residential areas.

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

3 STUDY AREA

The mining/reclamation operations that form part of City Deep are located within the city limits of Johannesburg. The City Deep Operations fall within the boundaries of the Johannesburg Magisterial districts and within the Greater Johannesburg Transitional Metropolitan Council.

4 EXPERTISE OF THE SPECIALIST

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

5 METHODOLOGY

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

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

1	2	3	4	5	6	7
Type of District	Equivalent continuous rating level ($L_{Reg,T}$) 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
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.						

NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken, and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7

NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.

NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, $L_{Req,d} = L_{Req,n} = 70$ dBA can be considered as typical and normal.

NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.

NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Aweighted sound pressure level of 50 dBA at a distance of 15 m from each individual source.

a The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise and the time of day.

b The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.

The probable community/group response to levels in excess of the acceptable rating levels are presented in Table 2, where $L_{Req,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time period of not less than 30 minutes. ‘A-weighted’ is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

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

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

According to the SANS 10103:2008 guidelines, ‘daytime’ is defined as anytime between 06:00 to 22:00, and ‘night time’ between 22:00 to 06:00. As a result of these guidelines, measurements were taken once during the daytime and once during night time at each identified noise receptor. Monitoring was taken at a measurement of 1.5

meters above ground level, and for a minimum period of 15 minutes (SANS 10103:2008).

The noise monitor used was a Quest Model 1200 Precision Integrated Sound Level Meter and was calibrated (calibration certificates are available on request). A list of identified receptors, where noise measurements were recorded, is presented in Table 3.

Baseline noise measurements were taken at all relevant noise receptors surrounding the tailings dumps and sand dumps, which form part of the City Deep Operations. The impact of the reclamation activities at each slimes dam/sand dump will be assessed individually by using the relevant baseline noise measurement levels. Cumulative impacts of all the reclamation activities which form part of the City Deep Operations will also be assessed. The following slimes dams/sand dumps that are being reclaimed are indicated in Table 3.

Table 3: Slimes dams/Sand dumps being reclaimed

Slimes dam/Sand dump ID	GPS coordinates	Site location
3A17	26°13'44.54''S 28°04'10.53''E	700m east of Wemmerpan
3L45	26°13'44.54''S 28°04'10.53''E	700m east of Wemmerpan
4A9	26°13'44.54''S 28°04'10.53''E	Heriotdale, adjacent to Cleveland rd on the eastern side and 150m south of the M2
4L25	26°13'44.54''S 28°04'10.53''E	Heriotdale, adjacent to Cleveland rd on the eastern side and 150m south of the M2
3A19	26°12'57.71'' 28°05'34.60	Situated on the south east corner of Chilvers st and the M2

Baseline noise measurements were taken at relevant locations around the above mentioned slimes dams/sand dumps. The relevant noise measurements of each slimes dam/sand dump are indicated in Table 4 - Table 6.

Table 4: Relevant measurement locations at 3A17/3L45

Noise measurement	GPS coordinates	Site location
C1	26°14'10.90"S 28° 3'56.41"E	Measurement was taken in the residential area of Regents Park.
C2	26°14'3.08"S 28° 3'32.87"E	Measurement was taken at the Union Bulldog R.F.C at Wemmerpan.
C3	26°13'34.28"S 28° 4'6.38"E	Measurement was taken at the Friendly Crocer distribution centre.
C4	26°13'52.14"S 28° 4'33.17"E	Measurement was taken at the fresh produce market.

Table 5: Relevant measurement locations at 3A9/3L25

Noise measurement	GPS coordinates	Site location
C6	26°13'23.85"S 28° 6'48.84"E	Measurement was taken at the entrance of Heritage Park.
C7	26°12'53.26"S 28° 6'45.79"E	Measurement was taken at industrial park west of 3A9/3L25.
C8	26°13'12.77"S 28° 7'8.90"E	Measurement was taken at industrial park south of 3A9/3L25, near PPC Cement plant.
C9	26°12'57.01"S 28° 7'16.52"E	Measurement was taken at industrial park east of 3A9/3L25..

Table 6: Relevant measurement locations at 3A19

Noise measurement	GPS coordinates	Site location
C12	26°12'41.87"S 28° 5'41.28"E	Measurement was taken at industrial park north of 3A19, near the back entrance of the Trade Centre.
C13	26°12'50.83"S 28° 5'18.35"E	Measurement was taken the at Johannesburg depot of Kargo National (pty) ltd. to the west of 3A19.

5.1 Results

Results obtained from the noise survey will be addressed per sample point. The results from the noise meter recordings for all the sampled points as well as the SANS rating limits are presented in Table 7. Additionally this table also presents the recorded date and time periods as well as the *in situ* meteorological conditions.

Table 7: Results of the baseline noise measurements

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
C1	Residential	Daytime	55	29.3	36.9 / 23.9	30/07/2009 12:40	Temp: 18°C Wind: north west @ 1 m/s Humidity: 28.3 %
		Night time	45	42.5	49.7 / 39.8	29/09/2009 23:35	Temp: 14.1°C Wind: north east @ 1 m/s Humidity: 68.3 %
C2	Residential	Daytime	55	29.6	44.7 / 23.9	30/07/2009 12:15	Temp: 18°C Wind: north west @ 1 m/s Humidity: 28.3 %

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
		Night time	45	44.7	53.6 / 41.7	29/09/2009 23:15	Temp: 14.1°C Wind: north east @ 1 m/s Humidity: 68.3 %
C3	Industrial	Daytime	70	42.9	53 / 38.3	30/07/2009 14:30	Temp: 20°C Wind: no wind Humidity: 28.3 %
		Night time	60	56.1	71.8 / 47.9	30/09/2009 00:15	Temp: 14.1°C Wind: north east @ 1 m/s Humidity: 68.3 %
C4	Industrial	Daytime	70	66.4	81.3 / 61.3	30/07/2009	Temp: 19°C

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
C6	Residential					13:25	Wind: north west @ 1 m/s Humidity: 28.3 %
		Night time	60	54.6	56.2 / 53.1	30/09/2009 00:00	Temp: 14.1°C Wind: north east @ 1 m/s Humidity: 68.3 %
		Daytime	55	45.7	66 / 31.1	06/08/2009 14:00	Temp: 30.1°C Wind: north @ 0.7 m/s Humidity: 26.4 %
		Night time	45	46.8	51.6 / 44.6	30/09/2009 23:30	Temp: 15.3°C Wind: north @ 0.9 m/s

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	L _{Areq,T}	Minimum/Maximum dBA	Date/Time	Meteorological conditions
							Humidity: 68.4%
C7	Industrial	Daytime	70	66.7	86.5 / 54.1	06/08/2009 12:30	Temp: 20.8°C Wind: north @ 0.5 m/s Humidity: 17.7%
		Night time	60	62.7	75.6 / 58.4	30/09/2009 23:25	Temp: 15.3°C Wind: north @ 0.9 m/s Humidity: 68.4%
C8	Industrial	Daytime	70	54.5	66.4 / 35.5	06/08/2009 13:30	Temp: 31.7°C Wind: north @ 0.5 m/s Humidity: 12.6 %

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
		Night time	60	48.8	74.8 / 46.4	30/09/2009 23:20	Temp: 15.3°C Wind: north @ 0.9 m/s Humidity: 68.4%
C9	Industrial	Daytime	70	54.2	71 / 45.6	06/08/2009 15:45	Temp: 19.3°C Wind: south south west @ 0.7 m/s Humidity: 57.3%
		Night time	60	48.7	54 / 46.6	30/09/2009 22:40	Temp: 15.3°C Wind: north @ 0.9 m/s Humidity: 68.4%

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Areq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
C12	Industrial	Daytime	70	63.1	71.5 / 54.7	31/07/2009 10:40	Temp: 19.9°C Wind: north @ 0.8 m/s Humidity: 28.9%
		Night time	60	63.9	74.9 / 43.1	30/09/2009 23:50	Temp: 15.3°C Wind: north @ 0.9 m/s Humidity: 68.4%
C13	Industrial	Daytime	70	52.3	78.8 / 48.3	06/08/2009 16:20	Temp: 20.5°C Wind: south south west @ 0.3 m/s Humidity: 40.4%

Sample ID	SANS rating limit			Measurement details			
	Type of district	Period	Acceptable rating level dBA	$L_{Aeq,T}$	Minimum/Maximum dBA	Date/Time	Meteorological conditions
		Night time	60	53.8	59.5 / 44.8	01/10/2009 00:00	Temp: 15.3°C Wind: north @ 0.9 m/s Humidity: 68.4%
	Indicates $L_{Aeq,T}$ levels above either the daytime rating limit or the night time rating limit						

Note: $L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level, in decibels, determined over a time period of not less than 30 minutes. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Sample point C1:

The measurement was taken in the residential area of Regents Park. The Daytime Leq level measured 29.3 dB which is below the SANS 10103:2008 daytime rating limit for residential districts. Noise associated with residential areas such as vehicular activity and domestic animals were the only recognisable noise sources. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient daytime noise level of the area.

The night time Leq level measurement was 42.3 dB which is below the SANS 10103:2008 night time rating limit for residential districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C2:

The measurement was taken at the Union Bulldogs Rugby Football Club at Wemmerpan, no sporting events were taking place at time of measurement. The daytime Leq level measurement was 29.6 dB which is below the SANS 10103:2008 daytime rating limit for residential districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient daytime noise level of the area.

The night time Leq level measurement was 44.7 dB which is below the SANS 10103:2008 night time rating limit for residential districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C3:

The measurement was taken at Friendly Grocer distribution centre. The daytime Leq level measured 42.9 which is below the SANS 10103:2008 daytime rating limit for industrial districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was audible, but as the measurement indicates the noise from the reclamation activities was not significantly impacting on the daytime noise levels at the Friendly Grocer and was at an acceptable level according to the SANS 10103:2008 guidelines.

The night time Leq level measured 56.1 dB which is below the SANS 10103:2008 night time noise rating limit for industrial districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C4:

The measurement was taken at the Fresh Produce Market. The daytime Leq level measured 66.4 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The main noise sources were the cargo trucks and the ventilation fans. The reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the daytime noise levels at the Fresh Produce Market due to the main noise sources such as the cargo trucks and ventilation fans being too high and subsequently 'drowning' out other noise sources

The night time Leq level measured 54.6 dB which is below the SANS 10103:2008 night time noise rating limit for industrial districts. The main noise source at the Fresh Produce Market was from the ventilation fans. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C6:

The measurement was taken at the entrance of Heritage Park in Rosherville. The daytime Leq level measured 45.7 dB which is below the SANS 10103:2008 daytime rating limit for residential districts. The main noise sources were the vehicles entering and existing Heritage Park. The reclamation activities of the slimes dam/sand dump 4L25/4A9 was not impacting on the daytime noise levels at Heritage Park.

The night time Leq level measured 46.8 dB which is slightly above the SANS 10103:2008 night time noise rating limit for residential districts. The main noise source influencing the measurement was the vehicular activity on the M33. The reclamation activities of the slimes dam/sand dump 4L25/4A9 was not impacting on the ambient night time noise levels at Heritage Park.

Sample point C7:

The measurement was taken at the industrial park to the west of the slimes dam/sand dump 4L25/4A9 in Heriotdale ext.8. The daytime Leq level measured 66.7 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The main noise source influencing the measurement was the ventilation fans of the warehouses in the area as well as the cargo trucks moving through the area. The reclamation activities of the slimes dam/sand dump 4L25/4A9 was not impacting on the daytime noise levels at the industrial park.

The night time Leq level measured 62.7 dB which is slightly above the SANS 10103:2008 night time noise rating limit for industrial districts. The main noise source was from the ventilation fans of the warehouses. The noise from the reclamation activities of the slimes dam/sand dump 4L25/4A9 was not impacting on the ambient night time noise level of the area.

Sample point C8:

The measurement was taken at the PPC Cement Plant to the south of the slimes dam/sand dump 4L25/4A9. The daytime Leq level measured 54.5 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The main noise

source was the trucks and vehicle traffic on the M33. The reclamation activities of the slimes dam/sand dump 4L25/4A9 was not impacting on the daytime noise levels.

The night time Leq level measured 48.8 dB which is below the SANS 10103:2008 night time noise rating limit for industrial districts. The main noise source during the night time was the trucks and vehicles on the M33. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C9:

The measurement was taken at the industrial park to the east directly adjacent to the slimes dam/sand dump 3L45/3A17. The daytime Leq level measured 54.2 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient daytime noise level of the area.

The night time Leq level measured 48.7 dB which is below the SANS 10103:2008 night time noise rating limit for industrial districts. There were no distinctively identifiable noise sources during the night time. The noise from the reclamation activities of the slimes dam/sand dump 3L45/3A17 was not impacting on the ambient night time noise level of the area.

Sample point C12:

The measurement was taken at the Trade Centre in the industrial park to the north of the sand dump 3A19. The daytime Leq level measured 63.1 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The main noise source influencing the reading was the vehicular traffic on the M2. The noise from the reclamation activities of the sand dump 3A19 was not impacting on the ambient daytime noise level of the area.

The night time Leq level measured 63.9 dB which is slightly above the SANS 10103:2008 night time noise rating limit for industrial districts. The main noise source influencing the reading was the vehicular traffic on the M2. The noise from the reclamation activities of the sand dump 3A19 was not impacting on the ambient night time noise level of the area.

Sample point C13:

The measurement was taken at the Johannesburg depot of 'Kargo National (PTY) LTD' to the west of the sand dump 3A19. The daytime Leq level measured 52.3 dB which is below the SANS 10103:2008 daytime rating limit for industrial districts. The main noise source influencing the reading was the vehicular traffic on the M2. The noise from the reclamation activities of the sand dump 3A19 was not impacting on the ambient daytime noise level of the area.

The night time Leq level measured 53.8 dB which below the SANS 10103:2008 night time noise rating limit for industrial districts. The main noise source influencing the reading was the vehicular traffic on the M2. The noise from the reclamation activities

of the sand dump 3A19 was not impacting on the ambient night time noise level of the area.

6 DISCUSSION OF RESULTS:

Based on the results from the baseline environmental noise measurements it is noted that the day time ambient noise levels at measurement C1, C2 and C6 which was carried out in residential districts ranged from between 29dB and 46dB, which is below the maximum allowable outdoor limit for ambient daytime noise in residential districts. The rest of the measurements were carried out in industrial districts in the City Deep area and the ambient noise levels ranged from between 42dBA and 67dBA which is below the maximum allowable outdoor limit for ambient daytime noise in industrial districts. The main noise sources influencing the measurements in the residential districts during the daytime were the vehicular traffic on the roads and the domestic animals. The main noise sources influencing the measurements in the industrial districts during the daytime were from cargo trucks, ventilation fans as well as vehicular traffic on the main roads running through the industrial parks such as the M33 and M2.

The night time ambient noise levels at measurement C1, C2 and C6 which was carried out in residential districts measured between 42dB and 47dB, which ranged from below the maximum allowable outdoor limit for ambient night time noise in residential districts, to slightly above. The rest of the measurements carried out in industrial districts in the City Deep area measured between 48dB and 64dB which ranged from below the maximum allowable outdoor limit for ambient night time noise in industrial districts, to slightly above. The main noise sources influencing the measurements in the residential districts during the night time were the vehicular traffic on the roads such as the M33. The main noise sources influencing the measurements in the industrial districts during the night time were from cargo trucks, ventilation fans as well as vehicular traffic on the main roads running through the industrial parks such as the M33 and M2.

7 ENVIRONMENTAL IMPACT ASSESSMENT

The reclamation activities do generate noise from the various sources. The expected noise levels of the primary noise sources are presented in Table 8.

Table 8: Noise levels at source of primary noise sources on site

Activity	Noise level at source measured in dBA
Excavator	± 98
Front end Loader	± 95
Screen	± 85
Haul trucks	± 90

The earth moving equipment and haul trucks on site are the primary source for continuous noise generated by the reclamation activities.

The impact assessment for the various phases for the reclamation activities follows below.

7.1 Impact assessment for the various phases

7.1.1. Construction phase

The reclamation activities of the slimes dams and sand dumps mentioned in this report are underway and are already in the operational phase of the project, thus the impacts have been assessed for the operational and decommissioning phases only.

7.1.2. Operational phase

The operation of the front end loaders, the screening of the material, and movement of the haul trucks as well as the associated reverse alarms of the vehicles are the main noise producing sources during the reclamation activities.

With the ambient noise measurement survey carried out during the operational phase and the results indicating that the reclamation activities are not impacting on the relevant receptors surrounding the individual slimes dams/sand dumps being reclaimed, the overall significance of the impacts are low.

7.1.3. Decommissioning phase

Impact: The activities of the decommissioning phase involve the following:

- Dismantling and removing of infrastructure;
- Stripping of vegetation to for urban development.

The construction machinery that will be operating during this phase will be the main noise producing sources.

The noise emissions from the decommissioning phase are expected to be lower than the emissions from the operational phase due to amount of machinery needed. The duration of the decommissioning phase will also be of relatively shorter term then the operational phase. The overall significance of the impact during the decommissioning phase on the ambient noise levels will therefore also be low.

8 MITIGATION MEASURES

The following mitigation measures are recommended to ensure the noise generated by the mining-related machinery and vehicles do not impact on the ambient noise levels surrounding each individual slimes dam/sand dump being reclaimed:

- Sources of noise should be pointed away from residential or affected receptors;
- Optimum location of pumps etc;
- Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers; and
- Switching off equipment when not in use.

9 CUMULATIVE IMPACTS

Cumulative impacts should be considered for the overall improvement of ambient noise levels. With most of the slimes dams/sand dumps being reclaimed as part of the City Deep project are situated in industrial districts of City Deep, Heriotdale and Denver. The noise levels in these areas are expected to be high. The main noise sources in these areas are the continuous operations of the ventilation fans of the various warehouses and workshops as well as the associated cargo trucks continuously transporting various goods. The most overwhelming noise source is the continuous vehicular traffic on the M2 which passes through most of the areas mentioned above and which greatly influenced the measurements during the noise survey.

The assessment of the noise produced by the reclamation activities indicated that the noise did not impact on surrounding receptors which were mostly warehouses and workshops and that the subsequent significance of the impact is low. The contribution of the noise from the reclamation activities were also insignificant, meaning that after the completion of the reclamation activities the noise levels will still be expected to be the same at all the locations the measurements were carried out.

10 KNOWLEDGE GAPS

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

11 ENVIRONMENTAL MONITORING PROGRAMME

Due to the low significance of the noise impact from the reclamation activities, it is recommended that ambient noise monitoring be conducted on a bi-annual basis throughout the operational and decommissioning phase to ensure the levels do not impact in the future. Components to be included in the proposed monitoring plan are discussed below:

The measurement locations should be taken at the locations shown in Appendix B. A report must be compiled bi-annually and submitted to management to ascertain compliance with the required standards. Mine management should be advised of any significant increase in the ambient sound level as operations continue. The measurement points must take into account noise sensitive receptors, such as farmsteads, schools, hospitals, churches and workshops.

- The A-weighted equivalent sound pressure level (LAeq) for duration not less than 15 minutes per monitoring point.
- Measurements to be taken during both daytime (06:00 to 22:00) and the night time (22:00 to 06:00).

12 CONCLUSION

It is concluded that the noise impacts from the reclamation activities is of a low significance because most of the slimes dams/sand dumps which are being reclaimed as part of the City Deep operations, are situated in industrial districts. The noise levels in these areas are expected to be high and that most relevant receptors such as warehouses and workshops have their own associated high noise producing sources.

After completion of the City Deep reclamation operations the noise levels will still be expected to be the same at all the locations the measurements were carried out, because of the industrial activities in the area which will continue to take place.

13 REFERENCES

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

National Environmental Management Act, Act no 107 of 1998

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

National Conservation Act, Act 73 of 1989

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

Appendix A: CV



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

Digby Wells & Associates (Pty) Ltd
Fern Isle; Section 10
359 Pretoria Ave
Private Bag X10046
Randburg; 2125
South Africa
Tel: +27 11 789 9495
Fax: +27 11 789 9498
Email: info@digbywells.co.za

SPECIALIST DECLARATION OF INDEPENDENCE

I, Lukas Sadler, declare that I –

- Act as the independent specialist for the undertaking of a specialist section for the project City Deep Noise Survey;
- 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

Digby Wells & Associates
Name of company

Signature of the specialist

02 Nov. 09
Date

Lukas Sadler

Lukas Sadler
Environmental Consultant
Digby Wells and Associates

EDUCATION

2002 – 2004: BCom Environmental Management (North West University)

2009: Short course in Occupational and Environmental Noise

PROFESSIONAL AFFILIATIONS

The National Association for Clean Air (NACA)

EMPLOYMENT

May 2006 – July 2007: West View Rail (pty) Ltd (London)

November 2007 - Present: Digby Wells and Associates

EXPERIENCE

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

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

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

PAST PROJECTS



















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

Appendix B: Location of noise sampling points

City Deep Noise Survey

Noise Monitoring Points

Legend

-  City Deep Noise Monitoring Points
-  Capital City
-  Major Town
-  Secondary Town
-  Other Town
-  Settlement
-  Arterial / National Route
-  Main Road
-  Minor Road
-  Track
-  Railway Line
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake
-  Non-Perennial Pan
-  Perennial Pan
-  Wetland

insert client logo here



Projection: Transverse Mercator Ref #: scc.CRO558.200910.209
 Datum: Hartebeesthoek 1994 Revision Number: 1
 Central Meridian: 29°E Date: 23/10/2009

