

To:	Xanthe Taylor	Date:	27/10/17
From:	Lukas Sadler	Proj #:	SIB4276
RE:	Environmental Noise Assessment for the Millsite Reclamation Project		

This memo serves to inform about the Environmental Noise Assessment for the Millsite Reclamation Project. (The information provided here will be included into the EMP Amendment Report directly as no standalone Noise Specialist study will be appended to the report.)

1 Methodology

1.1 Literature Review and Desktop Assessment

The approach used with investigating the noise impacts is based on the Gauteng Noise Control Regulations, GN 5479 of 1999 (PG 75 of 20 August 1999) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act No.73 of 1989) and the acceptable rating levels provided by SANS 10103:2008. According to the Gauteng Noise Control Regulations "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, the typical rating levels for ambient noise in districts, indicated in Table 2 of SANS 10103 (refer to Table 1-1 below).

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

Type of District	Equivalent continuous rating level ($L_{Req,T}$) 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



Type of District	Equivalent continuous rating level ($L_{Req,T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$	$L_{R,dn}^a$	$L_{Req,d}^b$	$L_{Req,n}^b$
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 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 1-2, where $L_{Req,T}$ 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 1-2: 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.		

1.2 Noise Propagation Modelling and Impact Assessment

Predictive modelling was performed for the proposed activities through the use of the modelling software SoundPlan. The software specialises in computer simulations of noise pollution dispersion. Estimates of the cumulative 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. The noise power levels were derived from the SoundPlan database.

Table 1-3: Sound power levels from main noise causing sources

Noise source	Sound power levels dB						
	63	125	250	500	1000	2000	4000
Truck	109	106	104	102	100	97	92
Excavators	113	117	107	108	106	101	95
Front end Loader	108	116	107	108	105	99	95
Diesel Generator	105	120	116	108	107	108	108
Pneumatic Tools	82	75	73	68	63	67	80

Noise source	Sound power levels dB						
Grader	88	87	83	79	84	78	74
Slurry Screening	105	105	105	105	105	105	105
Pump Station	69	79	86	92	95	96	96

The noise dispersion modelling software was used to assess whether the noise from the proposed project activities will comply with the Gauteng Noise Control Regulations. This was done by comparing the predicted propagating noise levels with the rating levels recommended by SANS 10103:2008, which are legally enforced by the Gauteng Noise Control Regulations.

2 Assumptions and Limitations

The following assumptions and limitations are included as part of this assessment:

- The construction phase is assumed to be carried out during daytime hours (06:00-22:00), therefore only daytime scenarios were modelled for the construction phase;
- The resulting noise contours represent worst case (unmitigated), LAeq at any receiver located 360 degrees in the horizontal plane around the noise sources. The noise modelling software is limited to calculating the predominant wind direction (or downwind conditions of propagation) per single receptor only. Calm wind conditions have therefore been included in the model due to the number of surrounding receptors. Thus, the noise dispersion plots do not represent a typical seasonal scenario in the predominant wind direction but rather a yearly average of the area's meteorological conditions in all directions; and
- The decommissioning phase was not modelled specifically as it is likely that it would produce similar results than that of the construction phase because of similar vehicle and machinery involved.

3 Baseline Environment

Baseline noise measurements were not carried out around the project footprint because the Gauteng Noise Control Regulations refer to acceptable rating levels recommended by SANS 10103:2008 to adhere to rather than measured baseline.

The baseline soundscape is however characterised by historical noise measurements undertaken in nearby areas as well as by the Noise Specialist's knowledge (supported by 8 years' experience in environmental acoustics) of typical noise levels in certain residential zones.

The relevant suburban residential areas identified for their close proximity to the project footprint are:

- Robinson (1200 meters south of the Millsite Complex);

- Greenhills (1700 meters south of the Millsite Complex);
- Wilbotsdal (1700 meters south of the Millsite Complex); and
- Waterval Plots (1300 meters north of the Millsite Complex).

The relevant rural residential/agricultural areas identified for their close proximity to the project footprint are:

- Elandsvlei (1500 meters west of the Millsite Complex);
- Waterval (500 meters north of the Millsite Complex);
- Battery (950 meters north west of the Millsite Complex); and

The average day and night time suburban noise levels are likely to range between 45dBA and 55dBA with vehicle activity on the interlinking roads within the suburban areas most likely the main noise source. The day and night time rural noise levels are likely to range between 35dBA and 50dBA with agricultural machinery and vehicles most likely the main noise source during the daytime and amphibians as well as insects such as *Gryllidae* (Crickets) and Cicada most likely the main noise source during the night time.

4 Impact Assessment

4.1.1 Construction Phase

The construction activities may impact on the ambient sound levels at surrounding receptors by causing noise disturbance in terms of the Gauteng Noise Control Regulations.

4.1.1.1 Project activities assessed

The Construction Phase noise was assessed in terms of the activities in Table 4-1.

Table 4-1: Interactions and Impacts of the construction activities

Interaction	Impact
Construction of pipeline	Noise disturbance from the construction vehicles and machinery
Site clearing and construction of the screens and pump stations	Noise disturbance from the construction vehicles and machinery

4.1.1.2 Impact description

The noise dispersion model run for the construction of the screen, pump stations and pipeline (refer to Plan 1 in Appendix A) indicate that the expected noise will not measure above the SANS 10103:2008 rating levels at the surrounding suburban and urban receptors and therefore not impact on the surrounding receptors. Based on the definition of disturbing noise in the Gauteng Noise Control Regulations there will be no disturbance although certain

noise sources may still be audible and therefore rated as a negligible impact on the surrounding receptors.

4.1.1.3 Management objectives

To minimise/prevent the noise impact of causing a noise disturbance at the surrounding receptors as a result of the construction activities and subsequently comply with the Gauteng Noise Control Regulations.

4.1.1.4 Management actions and targets

Construction activities should be restricted to daylight hours (this will keep the night time noise levels to a minimum). Construction related machinery and vehicles should be switched off when not in use.

4.1.1.5 Construction phase impact ratings

The table below summarises the rating of the impact significance for the construction phase.

Table 4-2: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the Construction Phase

Dimension	Rating	Motivation	Significance
Activity and Interaction (Site clearance and construction of the pump stations and pipeline)			
Impact Description: Noise will emanate from the machinery and vehicles operating during the construction activities.			
Prior to mitigation/ management			
Duration	Short term (2)	Noise will be produced for the duration of the construction phase	Negligible (negative) – 18
Extent	Local (3)	It is expected that during construction noise will extend as far as development site area.	
Intensity x type of impact	Minimal - negative (-1)	It is expected that during construction noise will have a minimal impact	
Probability	Unlikely (3)	It is unlikely that noise will impact on the surrounding receptors.	
Nature	Negative		
Mitigation/ Management action			
<ul style="list-style-type: none"> ▪ Restricting construction activities to daylight hours; ▪ Project related machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and ▪ Switching off equipment when not in use. 			
Post- mitigation			

Dimension	Rating	Motivation	Significance
Duration	Short term (2)	Noise will be produced for the duration of the construction phase	Negligible (negative) – 12
Extent	Local (3)	It is expected that during construction noise will be limited to site if mitigation measures are implemented.	
Intensity x type of impact	Minimal - negative (-1)	It is expected that during construction noise will have a minimal social impact	
Probability	Rare (2)	It is improbable that noise will impact on the surrounding receptors.	
Nature	Negative		

4.1.2 Operational Phase

The operational activities may impact on the ambient sound levels at surrounding receptors by causing noise disturbance in terms of the Gauteng Noise Control Regulations.

4.1.2.1 Project activities assessed

The Operational Phase noise was assessed in terms of the activities in Table 4-3.

Table 4-3: Interactions and Impacts of the operational activities

Interaction	Impact
Operation of finger screen	Noise disturbance from the screening activities
Operation of pump stations	Noise disturbance from the pump stations

4.1.2.2 Impact description

The operational scenarios were run for day and night times (refer to Plan 2 and Plan 3 in Appendix A). The noise modelling results indicate that the expected noise will not measure above the SANS 10103:2008 day and night time rating levels at the surrounding suburban and rural receptors, therefore not impacting on the surrounding receptors.

4.1.2.3 Management objectives

To minimise/prevent the noise impact of causing a noise disturbance at the surrounding receptors as a result of the operational activities and subsequently comply with the Gauteng Noise Control Regulations.

4.1.2.4 Management actions and targets

Due to the likely negligible impact no mitigation measures are required

4.1.2.5 Operational phase impact ratings

The table below summarises the rating of the impact significance for the operational phase.

Table 4-4: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the Operational Phase

Dimension	Rating	Motivation	Significance
Activity and Interaction (Operation of the screening activities and pump station)			
Impact Description: Noise will emanate from the screening activities as well as the pump station during the operational phase.			
Prior to mitigation/ management			
Duration	Project Life (5)	Noise will be produced for the duration of life of mine	Negligible (negative) – 16
Extent	Limited (2)	It is expected that during operation noise will extend as far as development site area.	
Intensity x type of impact	Minor - negative (-1)	It is expected that during operational phase noise will be limited to site	
Probability	Improbable (2)	It is improbable that noise will impact on the surrounding communities.	
Nature	Negative		
Mitigation/ Management action			
<ul style="list-style-type: none"> No mitigation required 			
Post- mitigation			
Duration	Project Life (5)	Noise will be produced for the duration of life of mine	Negligible (negative) – 16
Extent	Limited (2)	It is expected that during operation noise will extend as far as development site area.	
Intensity x type of impact	Minor - negative (-1)	It is expected that during operational phase noise will be limited to site	
Probability	Improbable (2)	It is improbable that noise will impact on the surrounding communities.	
Nature	Negative		

4.1.3 Decommissioning Phase

4.1.3.1 Project activities assessed

The Decommissioning Phase noise was assessed in terms of the activities in Table 4-5.

Table 4-5: Interactions and Impacts of the decommissioning activities

Interaction	Impact
Dismantling of pump stations	Noise disturbance from the demolition
Dismantling and removal of pipelines	Noise disturbance from the decommissioning activities

4.1.3.2 Impact description

The decommissioning activities using similar machinery and vehicles than the construction phase, it is expected that the significance of the noise impact during this phase will be similar.

4.1.3.3 Management objectives

To minimise/prevent the noise impact of causing a noise disturbance at the surrounding receptors as a result of the decommissioning activities and subsequently comply with the Gauteng Noise Control Regulations.

4.1.3.4 Management actions and targets

Decommissioning activities should be restricted to daylight hours (this will keep the night time noise levels to a minimum). Decommissioning phase related machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers. Switching off equipment when not in use.

4.1.3.5 Decommissioning phase impact ratings

The table below summarises the rating of the impact significance for the decommissioning phase.

Table 4-6: Pre-mitigation and post-mitigation significance ratings for impacts on noise during the Decommissioning Phase

Dimension	Rating	Motivation	Significance
Activity and Interaction (Dismantling and removal of the pump stations and pipeline infrastructure)			
Impact Description: Noise will emanate from the machinery and vehicles operating during the decommissioning activities.			
Prior to mitigation/ management			
Duration	Short term (2)	Noise will be produced for the duration of the decommissioning phase	Negligible (negative) – 18
Extent	Local (3)	It is expected that during construction noise will extend as far as development site area.	



Intensity x type of impact	Minimal - negative (-1)	It is expected that during construction noise will have a minimal impact	
Probability	Unlikely (3)	It is unlikely that noise will impact on the surrounding receptors.	
Nature	Negative		
Mitigation/ Management action			
<ul style="list-style-type: none"> Restricting decommissioning activities to daylight hours; Decommissioning phase related machines and vehicles to be serviced to the designed requirements of the machinery/vehicles to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and Switching off equipment when not in use. 			
Post- mitigation			
Duration	Short term (2)	Noise will be produced for the duration of the decommissioning phase	Negligible (negative) – 12
Extent	Local (3)	It is expected that during decommissioning noise will be limited to site if mitigation measures are implemented.	
Intensity x type of impact	Minimal - negative (-1)	It is expected that during decommissioning noise will have a minimal social impact	
Probability	Rare (2)	It is improbable that noise will impact on the surrounding receptors.	
Nature	Negative		

4.1.3.6 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 expected and also no post closure monitoring programme is recommended.

5 Environmental Management Plan

The objective of an EMP is to present mitigation to (a) manage undue or reasonably avoidable adverse impacts associated with the development of a project and (b) to enhance potential positives.

Mitigation measures will sometimes be built into the base of a project and should be considered as part of the “pre-mitigation” scenario; additional mitigation must be recommended if the impact assessment indicates it is necessary.

The key objectives of environmental and social management plans are to give S.M.A.R.T. mitigation measures to:



- Identify the actual environmental, socio-economic and public health impacts of the project and check if the observed impacts are within the levels predicted in the EIA;
- Determine that mitigation measures or other conditions attached to project approval (e.g. by legislation) are properly implemented and work effectively;
- Adapt the measures and conditions attached to project approval in the light of new information or take action to manage unanticipated impacts if necessary;
- Provide an auditable management plan that can follow the Deming Cycle;
- Gauge if predicted benefits of the project are being achieved and maximized; and
- Gain information for improving similar projects and EIA practice in the future.

The EMP must consider each activity and its potential (significant) impacts during the construction, operational and decommissioning phases. The EMP should be structured as described in Section 8.1.

5.1 Summary of Mitigation and Management

Table 5-1 provides a description of the mitigation and management options for the environmental impacts anticipated during the construction, operational and closure and rehabilitations phases. Additionally it also provides a summary of the project activities, environmental aspects and impacts on the receiving environment as well as the frequency of mitigation.

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Table 5-1: Mitigation and management plan

Activities	Potential Impact	Size and scale of disturbance	Aspects Affected	Phase	Mitigation Type/Measures	Compliance with standards/Standard to be achieved	Time period for Implementation
Construction of the pipelines; Site clearing for surface infrastructure; and Construction of surface infrastructure	Noise Impact	The expected noise from the proposed project will be limited to site	Site only and immediate surrounding area	Construction phase	Limit construction activities to daylight hours; Switch of vehicles and machinery not in use; and Machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers;	Gauteng Noise Control Regulations	Upon commencement of the construction phase
Reclamation activities; and Pumping activities	Noise Impact	The expected noise from the proposed project will be limited to site	Site only and immediate surrounding area	Operational phase	No mitigation measures required	Gauteng Noise Control Regulations	Upon commencement of the operational phase
Dismantling and removal of surface infrastructure including pipelines and pump stations; and Rehabilitation of TSF footprints	Noise Impact	The expected noise from the proposed project will be limited to site	Site only and immediate surrounding area	Decommissioning phase	Limit decommissioning activities to daylight hours; Switch of vehicles and machinery not in use; and Machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers;	Gauteng Noise Control Regulations	Upon commencement of the closure phase

5.2 Monitoring Plan

Due to the negligible nature of the potential noise impact, it is not recommended that a noise monitoring programme be implemented from the onset. In the event of a complaint being received however, it is recommended to monitor the noise levels near the complainant. Components to be included when monitoring is required are presented in in Table 5-2 below:

Table 5-2: Monitoring plan if required

Method	Monitoring locations	Frequency	Target	Reporting
<p>Sampled in accordance with the Gauteng Noise Control Regulations in conjunction with the SANS 10103:2008 guidelines;</p> <p>Noise measurement should be taken for a period not less than 10 min at each location</p>	<p>The noise measurements should be taken at the location of the complainant</p>	<p>To be conducted on an ad hoc basis if complaints of noise disturbance is received</p>	<p>Noise levels from the project should not measure above the SANS 10103:2008 rating levels for the specific district the receptor falls within.</p>	<p>A report must be compiled after the monitoring has been carried out then submitted to management to ascertain compliance with the required regulations and standards.</p>

6 Conclusion and Recommendations

Sibanye Stillwater proposes to reclaim the Millsite TSF Complex in Randfontein, Gauteng Province. The aim of the environmental noise impact assessment is to assess whether the proposed project will impact on the surrounding receptors by causing disturbing noise, as defined by the Gauteng Noise Control Regulations.

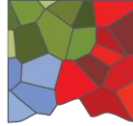
The results of the dispersion models indicate that the expected noise from the project will not measure above the SANS rating levels referred to by the Gauteng Noise Control Regulations at the surrounding receptors.

Regards,



Lukas Sadler

Environmental Consultant



DIGBY WELLS
ENVIRONMENTAL

Appendix A: Plans

Plan 1: Construction Noise Propagation

Plan 2: Operational Noise Propagation Daytime

Plan 3: Operational Noise Propagation Night time