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**NOISE IMPACT ASSESSMENT OF AND NOISE MANAGEMENT PLAN
FOR EXISTING AND POTENTIAL FUTURE NOISE SOURCES AT
KAAP AGRI WESGRAAN – KLIPHEUWEL SILO**

Prepared for
Sillito Environmental Consulting

Prepared by:
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12 June 2021

EXECUTIVE SUMMARY

Jongens Keet Associates (JKA) was commissioned by Sillito Environmental Consulting (Pty) Ltd to conduct a Noise Impact Assessment (NIA) and submit a Noise Management Plan (NMP) on existing noise sources and on activities associated with the proposed expansion of fuel storage capacity at the Wesgraan – Klipheuwel Silo.

An investigation into noise emitting from the existing operations of the Klipheuwel Silo established that the daytime rating level of noise was lower than the typical rating level for noise for an industrial district and therefore compliant with Regulation 4 of the Western Cape Noise Control Regulations, 2013 (NCR). No noise mitigation procedures were thus required. In terms of South African National Standard 10103:2008 *The measurement and rating of environmental noise with respect to annoyance and to speech communication* the intensity of noise impact is negligible.

The proposed addition of fuel tanks would have a negligible intensity of noise impact in terms of SANS 10103:2008 during the operation phase. It would be compliant with Regulation 4 of the NCR and no noise mitigation procedures would be required.

During the construction phase construction work would need to comply with the Noise Management Plan contained in Section 5 of this report.

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GLOSSARY

Terms defined in South African National Standard (SANS) 10328:2008, SANS 10103:2008.

Ambient noise

The totally encompassing sound in a given situation at a given time, and is usually composed of sound from many sources, both near and far. It includes the noise from the noise source(s) under investigation.

Decibel

The human ear subjectively judges the relative "loudness" of two sounds by the logarithm of the ratio of the two sound powers or power related quantities. Thus,

Sound power level, L_w

The sound power level, in decibels, emitted by a sound source relative to a reference sound power. It is given by the following equation:

$$L_w = 10 \log \left(\frac{w}{w_{ref}} \right) \text{ dB} \quad w_{ref} = \text{reference sound power} = 10^{-12} \text{ Watt}$$

Sound power is proportional to (sound pressure)² whence,

A-weighted sound pressure level, L_{pA}

The sound pressure level, in decibels, relative to a reference sound pressure, p_0 , and incorporating an electrical filter network (A-weighted) in the measuring instrument corresponding to the human ear's different sensitivity to sound at different frequencies. It is given by the following equation:

$$L_{pA} = 10 \log \left(\frac{p_A}{p_0} \right)^2 \text{ dBA} \quad p_0 = \text{reference sound pressure} = 20 \text{ micro Pascal}$$

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$

A formal definition is contained in SANS 10103. The term "equivalent continuous" may be understood to mean the "average" A-weighted sound level measured continuously, or calculated, over a period of time, T . It is often loosely termed "sound level" or "noise level".

Equivalent continuous rating level, $L_{Req,T}$

The equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$, measured or calculated during a specified time interval T , to which is added adjustments for tonal character, impulsiveness of the sound and the time of day. An adjustment of 5 dB is added for any tonal character, if present. If the noise is of an impulsive nature an adjustment of 5 dB is added for regular impulsive noise and 12 dB for highly impulsive noise. Where neither is present, such as road traffic noise, the $L_{Req,T}$ is equal to the $L_{Aeq,T}$.

Reference time interval

The time interval to which an equivalent continuous A-weighted sound level, $L_{Aeq,T}$, or rating level of noise, $L_{Req,T}$, is referred. Unless otherwise indicated, the reference time interval is interpreted as follows:

- Day-time: 06:00 to 22:00hrs $T=16$ hours when $L_{Req,T}$ is denoted $L_{Req,d}$
- Night-time: 22:00 to 06:00hrs $T=8$ hours when $L_{Req,T}$ is denoted $L_{Req,n}$

Residual noise (often referred to as background noise)

The ambient noise that remains at a given position in a given situation when one or more specific noises (usually those under investigation) are suppressed or absent.

District

This is related to, but not necessarily equal to, "land-use zoning" applied in urban and regional planning. For example, mixed-use zoning may comprise a central business district and a residential district.

Loudness

This is a subjective term often used by people to describe the magnitude of sound. However, this is not a term used in any standard or regulation. This note describes the relationship between the subjective term, "loudness", with the objective (measurable) physical quantities of sound.

We humans perceive the physical world around us by means of our senses of vision, touch, smell, taste and hearing. Each of these sensory responses are not linearly related to changes in physical stimuli but based on the logarithm of the ratio of the changes in physical stimuli.

As an example, doubling the power output of a loudspeaker (in Watts) will result in a 3 dB increase in sound pressure level at the listener. Yet, virtually all humans will not perceive any difference in what is subjectively described as "loudness". Any change or difference in sound pressure level of up to 3 dB is therefore considered to be insignificant. A 5 dB difference in level is distinctly noticeable and is considered to be significant while a 10 dB difference is generally perceived to be twice, or half, as "loud".



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NOISE IMPACT ASSESSMENT AND NOISE MANAGEMENT PLAN OF EXISTING AND POTENTIAL FUTURE NOISE SOURCES AT KAAP AGRI WESGRAAN – KLIPHEUWEL SILO

1 INTRODUCTION

Jongens Keet Associates (JKA) was commissioned by Sillito Environmental Consulting (Pty) Ltd to conduct a Noise Impact Assessment (NIA) and submit a Noise Management Plan (NMP) on existing noise sources and on activities associated with the proposed expansion of fuel storage capacity at the Wesgraan – Klipheuwel Silo.

This report presents the procedures and results of a Noise Impact Assessment (NIA) into existing noise sources at the Wesgraan – Klipheuwel Silo and potential noise sources associated with the proposed expansion of the existing fuel storage capacity by an additional five horizontal 83m³ capacity fuel tanks.

1.1 OUTLINE OF INVESTIGATION

The noise impact study was conducted in accordance with procedures contained in the South African National Standard (SANS) 10328:2008, *Methods for environmental noise impact assessments* as prescribed under the National Environmental Management Act Nr 107 of 1998. A summary of the procedure is outlined hereunder.

- Present the legislative framework pertaining to the investigation;
- Provide a brief description of the existing environment;
- Determine the typical rating levels for noise;
- Determine the existing rating levels of noise;
- Provide a brief description of the planned development;
- Identify existing noise sources and potential noise sources emanating from the proposed development;
- Calculate the expected rating level of noise due to the identified noise sources;
- Assess the impact of noise in terms of SANS 10103:2008 and the Noise Control Regulations;

- Investigate possible alternative noise mitigation procedures, where relevant;
- Prepare and submit an environmental Noise Impact Assessment report containing the procedures and findings of the investigation and include a Noise Management Plan, where relevant.

2 LEGISLATIVE FRAMEWORK

In accordance with the Environment Conservation Act 73 of 1989, two procedures exist for assessing and controlling noise, respectively:

- The South African National Standard (SANS) 10328:2008 *Methods for environmental noise impact assessments*.
- The Western Cape Noise Control Regulations (NCR), 2013, P.N. 200, 20 June 2013.

The glossary contains definitions of the terminology used in the measurement and assessment of sound/noise.

2.1 SOUTH AFRICAN NATIONAL STANDARDS

SANS 10328:2008 contains procedures to be followed to predict the impact of noise of a proposed development based on objective, scientific principles. The predicted impact is assessed in accordance with SANS 10103:2008 *The measurement and rating of environmental noise with respect to annoyance and to speech communication* by determining whether the rating level, $L_{Req,T}$, of the noise will exceed the measured residual (background) noise level at recipients or, in the absence of measured residual level, exceed the typical rating level of noise pertaining to the particular district as contained in Table 2 of SANS 10103:2008.

If the rating level, $L_{Req,T}$, of the ambient noise under investigation exceeds the measured and/or the typical rating level, it is probable that the noise would be annoying or otherwise intrusive to a community (such as residents) exposed to the noise. This excess is then related to the probable response of a community to the noise as indicated in Table 5 of SANS 10103. Tables 2 and 5 of SANS 10103 are reproduced in part hereunder.

SANS 10103:2008, Table 2 – Typical rating levels for noise in districts

1	2	3	4	5	6	7
Type of district	Equivalent continuous rating level ($L_{Req,T}$) for noise, dBA					
	Outdoors			Indoors, with open windows		
	Day-night $L_{R,dn}^a$	Day-time $L_{Req,d}^b$	Night-time $L_{Req,n}^b$	Day-night $L_{R,dn}^a$	Day-time $L_{Req,d}^b$	Night-time $L_{Req,n}^b$
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
d) Urban districts with one or more of the following: workshops; business premises; and 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

SANS 10103:2008, Table 5 – Categories of community/group response

1	2	3
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 community/group action
>15	Very strong	Vigorous community/group action

The **intensity** of a predicted noise impact was determined in relation to the categories of community response contained in Table 5 of SANS 10103 and is qualified as follows:

Negligible	Predicted $L_{Req,T}$ does not exceed the typical $L_{Req,T}$
Low	Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by between 0 & 5 dB
Medium	Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by between 5 & 10 dB
High	Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by between 10 & 15 dB
Very high	Predicted $L_{Req,T}$ exceeds the typical $L_{Req,T}$ by more than 15 dB

2.2 WESTERN CAPE NOISE CONTROL REGULATIONS, 2013

Certain regulations pertaining to the investigation are reproduced in this section. The reader is referred further to the complete regulations.

Land use Regulation 4.

4. (1) The local authority, or any other authority responsible for considering an application for a building plan approval, business license approval, planning approval or environmental authority, may instruct the applicant to conduct and submit, as part of the application –

- (a) a noise impact assessment in accordance with SANS 10328 to establish whether the noise impact rating of the proposed land use or activity exceeds the appropriate rating level for a particular district as indicated in SANS 10103; or
 - (b) where the noise level measurements cannot be determined, an assessment, to the satisfaction of the local authority, of the noise level of the proposed land use or activity.
- (3) Where the results of an assessment undertaken in terms of sub regulation (1) indicate that the applicable noise rating levels referred to in that sub regulation will likely be exceeded, or will not be exceeded but will likely exceed the existing residual noise levels by 5 dBA or more -
 - (a) the applicant must provide a noise management plan, clearly specifying appropriate mitigation measures to the satisfaction of the local authority, before the application is decided; and
 - (b) implementation of those mitigation measures may be imposed as a condition of approval of the application.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 EXISTING ENVIRONMENT

Kaap Agri (Pty) Ltd has an existing silo facility, called the Wesgraan – Klipheuwel Silo, where oats, wheat, maize, canola and grain harvested on the farmlands in the area are stored in large volumes. Grain carrier trucks as well as private farmers harvest their grains and sell them to Kaap Agri where they are stored at this facility before being taken to the mills for processing.

Figure 1 displays the location of the Klipheuwel Silo along Klipheuwel Road. It is located in an industrial district with typical day- and night-time rating levels of noise of 70 dBA and 60 dBA, respectively (refer Section 2.1). Since inception in the 1970's an informal settlement has grown between the Klipheuwel Silo and Afgri Animal Feeds Factory located some 300 m to the northwest of the silo.



FIGURE 1 Location of Kaap Agri Wesgraan – Klipheuwel Silo

The facility operates primarily during the grain harvesting season between September and December during week days between 08h00 and 17h00. It does not operate at night.

During normal loading of grain an internal suction fan operates in combination with chain conveyors located between the two rows of silos and an elevator hoist enclosed in the centre of the silo. The duration of each loading and fan operation is 20 minutes with, on average, 10 loadings occurring per day.

The audible source of noise is the suction fan outlet located on the western side of the silo. This is displayed in Figure 2.



FIGURE 2 Noise sources at silo and sound level meter location

Occasionally, during a bad harvest, the grain needs to be screened. Then two screening fans shown in Figure 2 are operating in addition to the normal suction fan. For each loading all three fans operate for approximately 25 minutes. According to the Silo

Manager this might occur 2 days in a week. The last time screening was required was in January 2021.

3.2 AMBIENT SOUND LEVELS

Sound measurements were recorded at the main site entrance gate (refer Figure 2) and along the fence at the northern end of the property (refer Figure 3) between 11h00 and 13h00 on Wednesday 2nd June 2021.

The weather was clear; temperature 17°C; zero wind speed.

The equivalent continuous A-weighted sound pressure level, L_{Aeq} , simultaneously with the A-weighted 1/3rd octave band equivalent sound pressure levels were measured using a Type 1 Larson Davis LxT1L precision impulse integrating sound level meter (Serial Nr. 0001138) mounted on a tripod with the microphone positioned 1,4 metres above the ground, at least 3 metres from any large sound-reflecting surface. The microphone was fitted with a windshield. Prior to and after the measurements the calibration of the meter, performed by M and N Acoustic Services cc, was checked using a Brüel & Kjaer type 4230 Calibrator (Serial Nr. 930792). Copies of first page of calibration certificates are included in the Appendix; complete certificates can be provided on request.

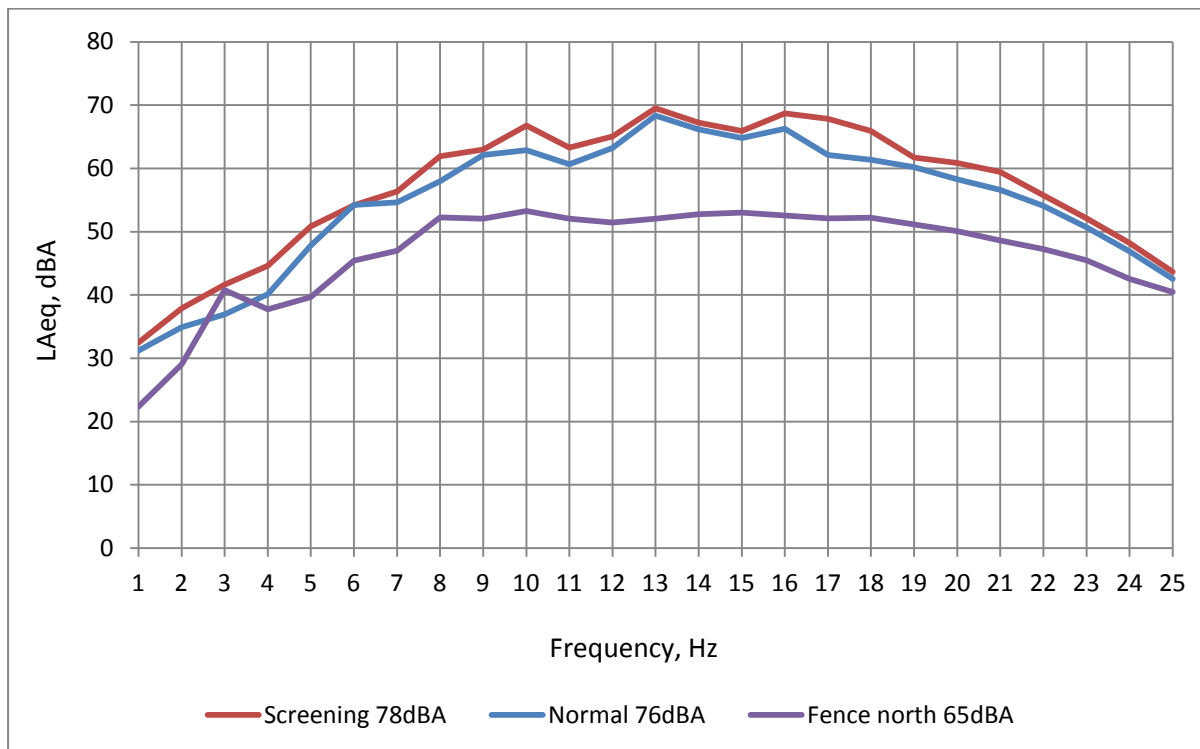


FIGURE 3 Sound level meter along fence at northern end of property

The results of the L_{Aeq} measurements, to the nearest dB, are recorded in Table 1 with the respective 1/3rd octave frequency band L_{Aeq} (sound level spectra) recorded in Figure 4.

Table 1 Results of measured L_{Aeq} dBA

ACTIVITY	DURATION, min	L_{Aeq} dBA
Front gate		
Normal loading – single fan	11	76
Screening – 3 fans	4	78
Fence at northern end of property		
Heavy vehicles passing every few minutes plus frequent heavy vehicle traffic on Klipheuwel Road. All fans off.	8	65

**FIGURE 4 Measured 1/3rd octave frequency band L_{Aeq}**

3.2.1 Observations

Figure 4 confirmed that the sound level spectra measured during normal loading and screening were both broadband and devoid of any pure tones.

There was frequent passage of a heavy vehicle to and from the Afgri Animal Feeds Factory on the road bounding the western property boundary. One of these is shown in Figure 3. It was understood that this traffic continued during daytime and night-time.

3.2.2 Impact of existing noise emanating from the silo

With reference to Section 3.1 during normal loading operations the duration of each loading and fan operation is 20 minutes with, on average, 10 loadings occurring per day.

Therefore the total duration of noise per day is 200 minutes = 3.33 hours. This represents 0.21 (21%) of a 16-hour daytime reference time period.

Averaging (logarithmically) the 76 dBA for 3.33 hours over the 16-hour daytime reference time period, the daytime rating level, $L_{Req,d}$, of silo noise becomes 69 dBA. This is lower than the 70 dBA daytime rating level for noise in an industrial district and therefore compliant with Regulation 4 of the NCR. No noise mitigation procedures were thus required. In terms of SANS 10103:2008 the intensity of noise impact is negligible.

Due to the infrequent screening operations in any year, the potential noise impact was not considered further.

4 PROPOSED DEVELOPMENT

There are 2 X 23m³ above ground diesel storage tanks at the Wesgraan Klipheuwel Silo Facility. The proposed application is to expand the existing fuel storage capacity by an additional five horizontal 83m³ capacity tanks on undeveloped land towards the northern end of the property. This is shown in Figure 5.

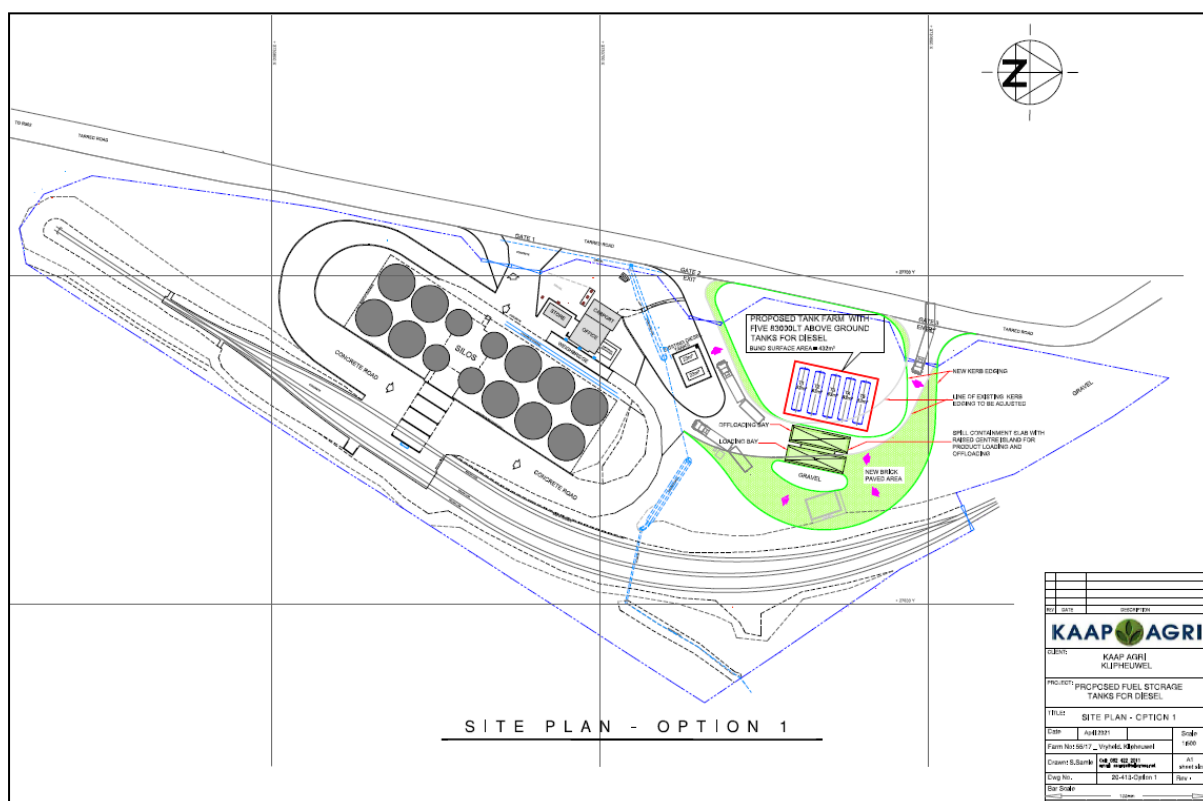


FIGURE 5 Site plan showing location of proposed additional fuel tanks

4.1 CONSTRUCTION PHASE

The proposed site is level. Concrete footings would need to be constructed to support the tanks. Portable cranes would lower each tank onto its respective footing where after pipes would be fitted to interconnect the tanks and electrical pump fitted. No major

construction work is envisaged. It is envisaged that the construction would be of very short duration; not longer than a few weeks.

The construction work would need to comply with the Noise Management Plan contained in Section 5. A summary of noise impact is contained in Table 2.

Table 2 Summary of noise impact during construction phase

Project phase	Construction			
Impact	Noise during construction activities			
Description of impact	Noise emanating from minor earthworks and heavy vehicles			
Mitigation possibility	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Compliance with Noise management Plan			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Brief	Impact would not last longer than a few weeks	Brief	Impact would not last longer than a few weeks
Extent	Limited	Limited to site and immediate surroundings	Limited	Limited to site and immediate surroundings
Intensity	Low	Social functions are somewhat altered	Very low	Social functions are slightly altered
Probability	Probable	Impact could occur	Probable	Impact could occur
Confidence	Medium	Based on common sense	Medium	Based on common sense
Reversibility	High	The affected environment will be able to recover	High	The affected environment will be able to recover
Resource irreplaceability	Low	The resource is not damaged irreparably	Low	The resource is not damaged irreparably
Significance	Minor - negative		Negligible - negative	
Cumulative impacts	It is unlikely that construction noise impact would exceed that of existing passing heavy vehicles.			

4.2 OPERATION PHASE

The operation would be similar to filling stations throughout the country. The tanks would be replenished from fuel tanker vehicles. A 3 kW electrically driven pump would then supply fuel to vehicles driving up to and parking at the pump. In general, noise associated with these activities would hardly be audible in the vicinity of the tanks let alone beyond the boundary of the property.

In terms of SANS 10103:2008 the intensity of noise impact would thus be negligible during the operation phase. It would be compliant with Regulation 4 of the NCR and no noise mitigation would be required.

5 NOISE MANAGEMENT PLAN

The proposed building works must be undertaken subject to compliance with Part F6 of the National Building Regulations and Building Standards Act No.103 of 1977 (as amended) and are to comply with the following standard best practice:

- All construction equipment utilised and activities undertaken must be compliant with the Western Cape Noise Control Regulations, 2013.
- All communities located within 200 m of construction activities are to be notified prior to work commencing and how long they will occur.
- Restrict construction activities generating noise outputs of 85 dBA or more to the hours of 08h00 to 17h00 Mondays to Fridays. Should the Contractor need to do this work outside of these hours, the approval of the Environmental Control Officer (ECO) must be obtained and surrounding communities must be informed prior to the work taking place.
- No amplified music shall be allowed on site. The use of audio equipment shall not be permitted, unless the volume is kept sufficiently low so as to be unobtrusive. The Contractor shall not use sound amplification equipment on Site, unless in emergency situations.
- If excessive noise is expected, neighbouring residents must be informed in advance of when the high noise levels will occur and for how long they will occur.
- The Contractor must post signage indicating contact details of the Contractor and/or ECO on the site to allow for reporting of complaints.

6 CONCLUSIONS

An investigation into noise emitting from the existing operations of the Klipheuwel Silo established that the daytime rating level of noise was lower than the typical rating level for noise for an industrial district and therefore compliant with Regulation 4 of the NCR. No noise mitigation procedures were thus required. In terms of SANS 10103:2008 the intensity of noise impact is negligible.

The proposed addition of fuel tanks would have a negligible intensity of noise impact in terms of SANS 10103:2008 during the operation phase. It would be compliant with Regulation 4 of the NCR and no noise mitigation procedures would be required.

During the construction phase construction work would need to comply with the Noise Management Plan contained in Section 5 of this report.

REFERENCES

South African National Standard 10328:2008. Methods for environmental noise impact assessments.

South African National Standard 10103:2008. The measurement and rating of environmental noise with respect to annoyance and to speech communication.

Western Cape Noise control Regulations, 2013

APPENDIX

Copy of calibration certificates of sound level meter and calibrator



M AND N ACOUSTIC SERVICES (Pty) Ltd

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CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER	2019-AS-1164
ORGANISATION	JONGENS KEETS & ASSOCIATES
ORGANISATION ADDRESS	8 WINGERD AVENUE, CONSTANTIA, CAPE TOWN
CALIBRATION OF	INTEGRATING SOUND LEVEL METER complete with ½" PRE-AMPLIFIER, ½" MICROPHONE and ½-OCTAVE FILTER
MANUFACTURERS	LARSON DAVIS and PCB
MODEL NUMBERS	LXT, PRM LXT 1L and 377M 05
SERIAL NUMBERS	0001138, 042837 and 100857
DATE OF CALIBRATION	23-24 OCTOBER 2019
RECOMMENDED DUE DATE	-----
PAGE NUMBER	PAGE 1 OF 5

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The measurement results recorded in this certificate were correct at the time of calibration. The subsequent accuracy will depend on factors such as care, handling, frequency of use and the number of different users. It is recommended that re-calibration should be performed at an interval, which will ensure that the instrument remains within the desired limits and/or manufacturer's specifications.

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Authorized/Calibrated by: M. NAUDÉ (SANAS TECHNICAL SIGNATORY)	Checked by: W.S. SIBANYONI (CALIBRATION TECHNICIAN)	Date of Issue: 29 OCTOBER 2019
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Director: Marlanka Naudé

CERTIFICATE OF CALIBRATION

CERTIFICATE NUMBER	2021-AS-0244
ORGANISATION	JONGENS KEETS & ASSOCIATES
ORGANISATION ADDRESS	8 WINGERD AVENUE, CONSTANTIA, CAPE TOWN
CALIBRATION OF	SOUND LEVEL CALIBRATOR
MANUFACTURER	BRÜEL and KJÆR
MODEL NUMBER	4230
SERIAL NUMBER	930792
DATE OF CALIBRATION	01 MARCH 2021
RECOMMENDED DUE DATE	MARCH 2022
PAGE NUMBER	PAGE 1 OF 3

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Calibrations performed by this laboratory are in terms of standards, the accuracies of which are traceable to national measuring standards as maintained by NMISA

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Calibrated by:  W.S. SIBANYONI (CALIBRATION TECHNICIAN)	Authorized/Checked by:  M. NAUDÉ (SANAS TECHNICAL SIGNATORY)	Date of Issue: 03 MARCH 2021
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Director: Marianka Naudé